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Friday, 25 January 2013
(10.00 am)
MR SHIEH: Mr Chairman, Mr Commissioner, overnight Dr Cheng has, I believe, performed the task that the Commission asked of him in filling up the plan that we can find in FS bundle 3.
THE CHAIRMAN: Can we put that on the screen.
MR SHIEH: It is now expert evidence bundle, page 398-1.
THE CHAIRMAN: Yes.
MR SHIEH: But by way of background, this is originally a document that one can find in FS bundle 3 at page 663. The current version on the screen is one Dr Cheng has kindly marked up overnight.
THE CHAIRMAN: Yes.
MR SHIEH: Perhaps I can start off by asking Dr Cheng to perhaps comment on what he has done.
DR CHENG YUK-KI (on former affirmation)
THE CHAIRMAN: Thank you for doing that, first of all, Dr Cheng.
May I remind you that you continue to give your evidence according to your original affirmation.
Examination by MR SHIEH (continued)
MR SHIEH: Dr Cheng, on the screen and I hope in front of you is a plan of the windows looked at on the port side and the starboard side of Lamma IV, where you have

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kindly marked the sliding windows. You have also kindly given a legend as to what the various notations mean. So if we could go through that. On the port side window R4 is a sliding door which is closed, because it says "S(C)"; correct?
A. Correct.
Q. Just to perhaps make sense of the notation, the windows are recorded as "R" and "G" because of red and green; right? Red for port and green for starboard?
A. Correct.
Q. The next sliding door on the port side is R8, which was closed at the time of your inspection?
A. Sliding window.
Q. Sliding window, which was closed at the time your inspection?
A. Yes.
Q. On the starboard side, there is only one sliding window which was open, G4; correct? It is at the bottom, starboard side. You marked it S(O).
A. Yes, G4, all are sliding window.
Q. Which was open.
A. Yes.
Q. Your notation straddled G3 and G4, but the actual window is G4, because you will see in a minute the actual photo. Because G3 is actually a window in the

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wheelhouse.
A. Correct, correct.
Q. Yes. We can see in the picture very soon. And G8 is a sliding window which was closed?
A. Yes.
Q. A similar notation applies to the main deck. I don't believe we need to go through that was because the legends are self-explanatory.
The shattered sliding windows are all found on the main deck?
A. Yes.
Q. Thank you. Could I now ask you to return to the text of your expert report, where we stopped yesterday, and that is in the expert evidence bundle, page 370. We stopped at paragraph 3.4.6, and we were on the point about the red paint, the strip of red paint smear which you took the view to represent the existence of a pipe which had been lost.
A. Yes.
Q. At this juncture could I ask you to return to the previous page at 369, because I should actually put to you what Dr Armstrong said about your paragraph 3.4.4.
You have had a chance of reading Dr Armstrong's two reports now?
A. Yes.

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Q. You may recall Dr Armstrong had made a comment on your paragraph 3.4.4, but I will take you through that slowly.
A. Yes.
Q. Paragraph 3.4.4, as you can see, you commented on the existence of deep blue paint smears in a position near the centreline. Do you see that; the fifth and the sixth lines?
A. Yes, I saw.
Q. The relevant photograph is photograph 19, which we can find at page 391 of the bundle. That was where you depicted, or the photograph showed, the deep blue paint smears.
A. Yes.
Q. Could I ask you to turn to the same bundle, page 474. This is where Dr Armstrong, in his second report, commented on your report. At paragraph 9, Dr Armstrong said:
"Subsequent to completion of my report ..."
By that, he meant his first report, which he compiled before seeing yours.
A. Yes.
Q. "... I have read the statement of Dr Cheng Yuk-ki, forensic scientist at The Hong Kong Government Laboratory. There are no obvious disagreements between

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the findings contained in the report of Dr Cheng and my own report, and some of the issues raised by Dr Cheng have helped to clarify some items in my report, specifically ..."

(a) we can skip over for the time being, save perhaps to remind my learned friend to follow up on the documentation concerning the dismantling of the metal plating. But at (b), you can see:

"The blue paint smear referred to in paragraph 3.4.4 of Dr Cheng's report ..."

Which is the paragraph we have just seen; correct?

A. Yes.

Q. "... and illustrated in his photograph 19 ..."

In fact, it's photographs 19 and 20. I think they both depict the sort of damage that we could find on the port side. The blue smears were actually found at photograph 19.

A. Correct.

Q. But we'll read on:

"... provides excellent correlation with the sketch included in my report in appendix IV on page 64, being the plan view of the two collided craft at an elapsed time of 2.0 seconds and showing the calculated maximum extent of penetration of Sea Smooth into Lamma IV. This sketch is reproduced in appendix 4 item 18, showing the

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location of the blue paint smear from Sea Smooth within the cabin of Lamma IV, and thus representing the maximum penetration of one craft into the other."

Now, let's trace through the way in which Dr Armstrong introduced his various sketches in his first report. Could I ask you to turn to the same bundle, page 462. In fact, we should start, to make sense of this page, from page 456.

Dr Cheng, I think for present purposes it is probably not necessary for us to go into great detail as to the minute measurement of each of these sketches.

A. Okay. I agree.

Q. Do you agree? Because I think Dr Armstrong was simply trying to demonstrate a point about the almost exact correlation with his own independent finding --

A. Yes.

Q. -- together with your actual inspection on the spot.

You can see that from page 456 onwards, Dr Armstrong was trying to reconstruct, based on his calculations, the manner in which the two vessels moved relative to each other and their relative position from the point of impact onwards.

Page 456 represents the point of impact, 0 seconds. Page 457, 0.15 seconds. Page 458, 0.31 seconds. Page 459, 0.57 seconds. Page 460, 0.82 seconds.

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Page 461, 1.1 second. And page 462, 2 seconds.

As I say, no need to be absolutely arithmetically precise --

A. Okay. I understand.

Q. -- because, as you would know, being a scientist, these all depend on the assumptions and the underlying data you put.

A. Yes.

Q. You would agree with that?

A. Agree.

Q. At page 462 is the plan or the sketch which Dr Armstrong referred to in the relevant part of his report, which he actually reproduced but with a colour scheme in his second report at item 18.

Could I ask the screen to show page 486.

Page 486 is actually the same as page 462, except that there is a blue colour in the middle; you can see that, Dr Cheng?

A. Yes, I saw it.

Q. I think the point Dr Armstrong was seeking to make is that your discovery of the blue paint smear actually coincided or provides a very good correlation with his independent finding based on his sketches as to the maximum point of penetration.

A. Yes.

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Q. Because if you page 486, and if we were to zoom in on the blue line, that point of maximum penetration or the point of contact between the port hull of Sea Smooth was where around about the place where you discovered the blue paint mark.

A. Yes.

Q. And Dr Armstrong regarded that as providing some support for his sketches.

Looking at the series of sketches which Dr Armstrong had done, would you agree that that represents broadly the manner of penetration of Sea Smooth into Lamma IV at the material time?

A. Yes. First, I agree the position marked by Dr Armstrong, which is where I observed my blue paint smear.

Q. That's page 486?

A. Yes.

Q. Thank you.

A. Also I agree the sketch that the penetration should be depicted at page 486. That's why the air-conditioning unit at the rear was also crushed.

Q. Perhaps with the help of the cursor, you could find out where on this sketch the air-conditioning unit was.

A. Next to the blue smear. Yes, the rectangular -- yes, this one.

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Q. Yes. So that represents the crushed air-conditioner unit?
A. Correct.
Q. Which in fact was crushed --
A. Yes.
Q. -- as you observed.
Thank you very much, Dr Cheng, for that.
We now return to the text of your report page 370.
We had finished paragraph 3.4.6 yesterday.
Paragraph 3.4.7, you talked about fallen ceiling panels and life jackets. Paragraph 3.5.1, you described the wheelhouse.
Paragraph 3.6.1, you describe the upper deck cabin. There was a 0.7-metre-wide door aft opened out to the weather deck. There was another 0.7 metre door at the front which opened out to the wheelhouse. The centre was a staircase to the main deck. So that was the staircase leading down; correct?
A. Correct.
Q. "There were a total of 12 windows on both sides, of which 4 were sliding windows and 8 were fixed windows."
Could I ask you to look at your sketch of the windows at page 398-1.
If we look at the top, the main deck, we can actually see on both port and starboard, they run from

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R1 to R9, and G1 to G9; correct?
A. Yes, the upper deck.
Q. Yes. But of these windows, the three in front, R1 to R3 and G1 to G3, those actually are in the wheelhouse and, therefore, for the purpose of the deck, we ignore those; correct?
A. Correct.
Q. Therefore it's really G4 onwards to G9, and R4 onwards to R9 which were the windows that you saw in the main deck cabin; correct?
A. I call it upper deck cabin.
Q. Upper deck cabin, sorry.
A. Correct.
Q. Thank you.
"Most of the windows measured 0.9 metres wide by 0.7 metres high. Only the first sliding window on the starboard side was open and its opening was measured to be about 0.4 metres wide by 0.7 metres high."
If you look at the photograph at page 392, I think that shows it. This depicts the starboard side. The window that was open, which is shown by the red arrow on the left-hand side, that actually corresponds to window G4; correct?
A. Correct.
Q. Thank you. And the fixed window corresponds to window

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G7; correct?
A. G7, correct.
THE CHAIRMAN: Do we have any photographs of the nature of the catch or the locking mechanism on the sliding window?
MR SHIEH: Which enables one to open it. We'll follow that up.
THE CHAIRMAN: Thank you.
MR SHIEH: It will probably be in either M1 or the police album. We'll follow that up, Mr Chairman. It is being followed up.
Whilst we are on this photograph, page 392, we can see a solitary pair of chairs on the left-hand side. Do you see that, the pair of chairs?
A. Yes.
Q. The white chairs. That represents the only remaining set of chairs that you could find on the scene.
A. Yes. In the upper deck cabin.
Q. Yes, during your inspection.
A. Yes.
Q. All the rest were --
A. Missing.
Q. -- missing.
THE CHAIRMAN: That's one chair, is it not?
A. Just one.

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MR SHIEH: Sorry, just one.
A. Just one.
Q. Yes, with four legs mounted. Just one.
Because in the next paragraph, you mentioned in the first sentence:
"The upper-deck cabin was almost bare and had only one seat near the entrance to the wheelhouse ..."
That is the one we have just seen?
A. Yes.
Q. "... which disagreed in the seating arrangement with the deck plan."
I take it that you mean on the deck plan there should be far more chairs than only that chair?
A. Yes.
Q. "The only seat, with an appearance agreed with those in the main deck cabin, had a white plastic seat and back ..."
What do you mean by "with an appearance agreed with those in the main deck cabin"? Because in your terminology, "main deck" is the deck below?
A. Yes.
Q. Right, okay.
"The only seat ... had a white plastic seat and back with four metal legs, each having a rectangular mounting plate at the base, which was secured to the deck by

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a pair of 2.7 cm screws (see photo 23 ...)."
That we can find at page 393. Dr Cheng, that is the photo taken of the actual mounting plate of that remaining chair?
A. Correct.
Q. No bolts?
A. No bolt, and --
Q. Because if there had been bolts actually, the screw would have been screwed in from the bottom and the bolts would appear where you can see?
A. There should be a nut underneath the floor.
Q. Yes, yes.
A. So I went -- and this, the shape and the size indicate this is a screw, because it has a tapered end.
Q. Yes.
A. For a bolt, it should have a flat bottom.
Q. Yes.
THE CHAIRMAN: And you attach a nut to the bottom of the bolt?
A. Yes.
THE CHAIRMAN: With a washer?
A. Yes, correct. Usually should have a washer.
THE CHAIRMAN: Because that spreads the force, doesn't it? If you have a washer, it spreads the force?
A. So the nut will not be loosened easily, have the washer.

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THE CHAIRMAN: Yes, because the force is spread.
A. Yes, correct.
MR SHIEH: You made a comparison with a bolt that you could find for the seats in the main deck cabin, and by way of comparison, if we look at page 390, that's where we can see the bolt. That's correct?
A. Yes, correct.
Q. That's the contrast that you were seeking to draw?
A. Correct.
Q. Thank you.
"Rectangular imprints with a pair of holes agreeing in size and shape with the mounting plates of the legs were found on the deck of the upper deck cabin ..."
We can see page 393, photo 24. That's the rectangular imprint that you refer to?
A. Yes.
Q. But this is a sample, because you say "rectangular imprints", so there are many of these?
A. Many, many.
Q. Many of these.
"... and the arrangement of the imprints was found to agree with the seating arrangement as depicted in the deck plan, having eight rows. Numerous ..."
THE CHAIRMAN: Have we located the deck plan that Dr Cheng was referring to? This, I understand, was one he found

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on the vessel; is that right?
MR SHIEH: I think posted on the walls.
A. Yes.
THE CHAIRMAN: Have we got a photograph of that?
A. I have seen this deck plan in the court, in here.
MR SHIEH: Yes.
A. It should be the one -- let me see.
MR SHIEH: Again it's something we'll follow up on because it was touched on yesterday as being found on the wall, and I think there was a reference to a photograph.
THE CHAIRMAN: This is photographed in one of the bundles.
MR SHIEH: Yes. It's being located, but can I move on while it's being located?
THE CHAIRMAN: Yes.
MR SHIEH: "Numerous screws, agreeing in dimension and general appearance with those for securing the only seat in the upper deck cabin, were found at the rear end of the cabin. Further examination of the rectangular imprints revealed most of them, each having a pair of holes 6 cm apart, but at least 10 of them having at least one or two additional holes, suggesting that the seats for these positions could have been remounted for at least once previously."
For the photograph, we can find it at page 394.
Could you explain to us your reference to the two

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holes? Basically we can see two pairs of holes.
A. Yes.
Q. If the cursor move perhaps to 10 o'clock.
A. This one?
Q. Yes, this hole, together with this hole (indicates) --
A. A pair.
Q. -- would be a pair?
A. Correct.
Q. And the hole next to -- this hole together with this hole (indicates) represents --
A. Another pair.
Q. -- another pair?
A. Correct.
Q. That's why you drew the conclusion that perhaps after one pair has been mounted, it's been dismounted or detached and moved to the other position and remounted and that resulted in the other pair of holes?
A. Yes, correct.
MR SHIEH: Thank you.
Mr Chairman, the search for that deck plan is underway.
THE CHAIRMAN: Thank you.
MR SHIEH: Paragraph 3.6.3:
"The deck of the upper deck was made up of material similar to that of the side panel of the main deck

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cabin, having vinyl tiles over approximate 3 mm thick fibreboard on top of approximate 3 cm thick green foam (see photo 26)."

That's page 394. We can see the foam in the middle, the fibreboard layer, and then covered by the tile.

A. Yes.

Q. Just to follow up, this hole was created just for the purpose of your inspection?

A. Yes, correct. Made by me.

Q. By you. Thank you.

"Therefore, the anchorage of 2.7 cm screws for securing the only seat ... depended on the strengths of the fibreboard and foam."

I will have more questions to ask about the mechanism for securing the seats later, because you have devoted a certain section about your test of the strength of the mounting. But I'll move on.

Paragraph 3.6.4:

"Examining the row of 5 connected seats, reportedly salvaged from the scene on 31 October 2012, revealed the two holes of its middle front mounting plate attached with heads of two rivets and their snapped cylindrical shafts."

For that, we look at page 395. On the deck, corresponding to the position of the middle -- first of

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all, can you confirm that the top of page 395 is what you are talking about, the row of five connected seats?

A. Yes, the middle front legs belong to.

Q. Yes. The two holes of its middle front mounting plate?

A. Yes.

Q. Can you identify the snapped cylindrical shafts?

A. It cannot be revealed in this photograph. Should be look from the bottom of the mounting plate of the legs. So we can just see the rivet head here.

Q. Because they would be buried in the hole?

A. Yes.

Q. Basically the shaft broke?

THE CHAIRMAN: These were secured by rivets to a plate?

A. Yes, correct.

THE CHAIRMAN: And the rivets failed?

A. Yes.

MR SHIEH: Basically it broke?

A. Yes, broken into two parts.

Q. Yes, and one part was actually buried in the hole, which we can't see now?

A. Yes.

THE CHAIRMAN: Just so that I can understand this. There were five seats in a row connected to one another?

A. Yes, correct.

THE CHAIRMAN: How were all five of them secured to the

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deck?

A. Okay. For a row of five seats, it will have a total of six legs, three in the front, three in the bottom. That is a whole metal frame, a whole metal frame. So this metal frame was secured to the floorboard through these six legs.

THE CHAIRMAN: Three at the front, three at the back?

A. Yes, correct. And all the vices was mounted on the metal frame.

THE CHAIRMAN: And this is one illustration of the six mounting plates?

A. Yes.

THE CHAIRMAN: But all six had failed?

A. Just -- I found only this, the middle front leg, used the rivet. For the other legs, I think the screw should be used because I cannot find the remnant of the rivet.

THE CHAIRMAN: So only one of the six attachments was this rivet method of doing it?

A. Yes.

THE CHAIRMAN: And that was middle front?

A. Middle front, correct.

THE CHAIRMAN: The others were all screws?

A. Correct.

THE CHAIRMAN: Self-tapping screws?

A. Yes, the self-tapping screw.

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THE CHAIRMAN: So they'd pulled out?

A. Yes, already pulled.

THE CHAIRMAN: Because they weren't there?

A. Yes.

MR SHIEH: I was trying to see if we could have a pictorial depiction of what the five-seat would have looked like.

Dr Cheng, if I could trouble you to look at the police album, album III. This is a series of photographs I will ask you to look at when we get to the weather deck, but I think we might as well look at it now. Page 168.

Can you see the row of five chairs lying down?

A. Yes, but this is not the one salvaged on 31 October. This is the other set of seats.

Q. So the five seats that you saw --

A. Looked like this one.

Q. Looked like this one?

A. Yes, the same.

Q. Yes. I was trying to match, because in your album you did not take a picture of the five seats.

A. Okay.

Q. But I was trying to see if this one matched.

So this one looks like the sort of five-seat structure?

A. Yes. So you can see the metal frame on the left side,

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and a total of six legs.
Q. Six legs?
A. Yes, correct.
THE CHAIRMAN: So the legs are in a U-shape --
A. Yes.
THE CHAIRMAN: -- presenting three of the front, and the other side of the U presents three at the back?
A. Yes, correct. And the chair I used is in page 352.
MR SHIEH: Of the album?
A. Yes, of the album. Correct.
Q. Page 352. Right. This is album VII, photographs taken on 2 November?
A. Yes.
THE CHAIRMAN: This is a photograph of a set of chairs that survived in situ on the port side of the aft upper deck, is that right, within the cabin?
A. Yes.
MR BERESFORD: Mr Chairman, I'm not sure if they survived in situ. I think they've just been --
MR SHIEH: Because the whole deck was empty except for that one solitary chair outside the wheelhouse. This was probably reconstructed.
THE CHAIRMAN: Is that the case, this is simply a reconstruction?
A. Correct.

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THE CHAIRMAN: Matching up the holes in the deck with the legs?
A. Yes. This is the position, we can find a metal plate with a rivet tail, and I cannot find any rivet tail in the middle row because I finally found one on the left side, but I did not make a detailed examination. But this is the only position I can match this row of seats, should be on the port side, last three rows.
THE CHAIRMAN: Thank you.
MR SHIEH: Let me just get the matter clear. Of the entire upper deck, the only chair that survived in situ was that one chair that we find outside the wheelhouse?
A. Yes.
Q. Which remained attached?
A. Yes.
Q. This one is an attempt to match up a detached set of five seats --
A. Yes.
Q. -- which represents your best effort in trying to match up by looking at the mounting plate and the rivets, and this was the closest you could get to trying to reconstruct where these five chairs used to be before the accident?
A. This is the only position I can match.
Q. Only position you can match?

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A. Yes.
Q. Thank you. And again, three legs in front, three legs at the back; correct?
A. Yes.
Q. Thank you. Perhaps we can return to the text of your report at paragraph 3.6.4. You said:
"On the deck, corresponding to the position of the middle front leg of the last third row of seats on the port side was a rectangular metal plate of about 12 cm by 5 cm, which had been screwed to the deck by four pieces of screws. In the middle of the rectangular metal plate were two holes 6 cm apart each engaged with a snapped rivet tail. When the 5-seated bench was placed according to the rectangular imprints on the deck, the two rivet heads matched with the two rivet tails ... strongly indicated that the middle front leg of the bench had been affixed to the deck using two rivets. Removing the rectangular metal plate revealed two holes on the deck, which appeared larger than the other screw holes for mounting the seats."
First of all, the five-seated bench you talked about is one that we have just seen?
A. Correct.
Q. You say:
"Removing the rectangular metal plate revealed two

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holes on the deck, which appeared larger than the other screw holes for mounting the seats."
Which metal plate are you talking about: the middle one?
A. The metal plate attached to the deck, on the deck, that is attached with the rivet tail.
THE CHAIRMAN: That's the middle at the front?
MR SHIEH: The middle, the front?
A. The middle, yes.
THE CHAIRMAN: At the front?
A. At the front, yes.
MR SHIEH: Because that was where you found the rivet?
A. Yes, the rivet tail.
Q. All the rest, there were screws?
A. Yes.
Q. "... which appeared larger than the other screw holes for mounting the seats."
The reason was that those two holes were not penetrated by screws; they were penetrated by rivets?
A. No, I think maybe because the screw had made the hole larger. So that's why if still use the screw again, it cannot secure the leg on the deck. That's why my opinion is that they just make it simple, to make a metal plate on it and drill four screws onto the deck at the corner of the metal plate, and then use another

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tool, that is a rivet, to secure the leg.
THE CHAIRMAN: So you infer that the two larger screws had failed, as it were, and this had been replaced by the plate with four screws in it?
A. Yes. At four corners. So this new metal plate provided a support for the rivet to secure the middle front leg to the deck.
THE CHAIRMAN: Do you have a photograph that illustrates these two larger screw holes?
A. My own have been -- but the police have also taken this photograph. I'm not sure whether they have put it in the album.
THE CHAIRMAN: Well, they've put hundreds of them into the album, so ...
MR SHIEH: We will follow that up.
My learned friend Mr Beresford has kindly reminded me that the five seats Dr Cheng used for the purpose of his reconstruction exercise were actually salvaged from the seabed at the collision location. That we can actually find in the index page of the album.
THE CHAIRMAN: Yes.
MR SHIEH: We will provide the actual item number in due course. But the five seats were actually salvaged from the seabed.
Dr Cheng, if I could try and help you perhaps jog

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your memory. Could I ask you to -- ah. If we look at police album VII, page 349. If we look at description 3, it says "Seat salvaged from the seabed at the collision location placed on the upper deck".
A. Yes.
Q. That is photo 3, which corresponds to page 352. You see that photo is number 3?
A. Yes.
Q. So the five seats that you used for the purpose of your exercise is actually a set of five seats salvaged from the seabed?
A. That is what I examined.
MR SHIEH: Thank you.
Mr Chairman, I think that describes the --
THE CHAIRMAN: All I was asking is, if one looks at photograph 27 in Dr Cheng's bundle, page 395 -- as I understand your evidence, you're saying that you removed that plate and beneath it you found two other larger screw holes?
A. Yes.
THE CHAIRMAN: I'm asking whether I can see a photograph of those.
A. Personally I have a photograph here which shows the two holes.
THE CHAIRMAN: Yes. Let's take advantage of that.

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MR SHIEH: We can see that, and then for it to be scanned.
THE CHAIRMAN: Perhaps you'd be kind enough to pass it up.
(Handed).
A. Mr Chairman, I found the corresponding photo from the police album, pages 420 and 421.
THE CHAIRMAN: Thank you. Yes. Yes, that --
A. Maybe we can start from page 419. This is the original form. Then --
MR SHIEH: Before the dismantling?
A. Yes, before dismantling.
Page 420, first we removed the four screws at the corner and then, page 421, we removed the metal plate. And then we can see a pair of holes. Yes, these are the holes that I said appear larger than the other screw holes.
THE CHAIRMAN: Yes, well, that does illustrate exactly what you've got in your own bundle, so I'll return your own bundle to you. Thank you.
A. Okay. Then in photo 4, page 422, we can see the snapped rivet tail in the metal plate. The cursor points to the position. It's a rivet tail.
THE CHAIRMAN: So are these four screws or are these four bolts?
A. I would call it also self-tapped screw, not bolt.
THE CHAIRMAN: But what is the head?

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A. The head?
THE CHAIRMAN: It's not a cross-head, is it, like the other ones we've seen?
A. Also cross-head, I remember. Let me see.
THE CHAIRMAN: A bolt head is --
A. Yes, it's a bolt head, but the tip of this bolt, maybe we can call it bolt, but you can see it's pointed. That means if drilled into the soft substrate, it can make a hole on its own. Because when we're talking about the bolt, we suppose that on the floor, we will originally make a hole. Because the bolt has a blunt end, it cannot drill a hole on its own.
THE CHAIRMAN: Yes, I understand the point. Thank you.
MR SHIEH: But just to put this in its proper context, the reason this particular leg was detached is not because of the four screws on the four corners, because for this particular plate, obviously when you found it, the four screws still attached this metal plate to the floor?
A. Correct, firmly attached.
Q. The problem lay with the rivet which snapped?
A. Yes. The rivet is normally not strong enough for this kind of purpose.
Q. As you said at page 422, you could actually see the way it broke?
A. Yes.

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Q. And the remains of that, the rivets, I mean?
A. Yes.
THE CHAIRMAN: Before you move on, did you find any other similar plates like this in the deck, that is to say, with these four bolt heads but sharp ends to the screws?
A. At the end of -- when I prepared my report finally, I saw one of the photographs I'd taken, should be at the edge, I see similar metal plate. But I didn't make a detailed examination at the scene, so I did not report it. Because I just -- from a photograph, I saw the image of a metal plate. But I did not make further examination.
THE CHAIRMAN: Do you have --
A. But I think maybe more than one.
THE CHAIRMAN: Are you able to locate those photographs that illustrate this elsewhere in the vessel?
A. I can, but the photograph is in my laboratory. I do not have this photograph here.
THE CHAIRMAN: No, I understand that. But no doubt they could be obtained for you?
A. Yes, maybe. Yes. Maybe I can provide it -- I'll try to provide it in the afternoon if possible.
THE CHAIRMAN: Yes. Thank you. Thank you very much. But your point on this is that whereas these four bolt-head-but-sharp-pointed screws were secure and in

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place, what failed was the rivets and they are not normally strong enough for this purpose?
A. Yes, because these kind of rivets are usually made by some soft metal. That's why when the rivet mount -- how do you say? The mechanism is that a rivet put into a hole, and then use a machine to draw a bit at the bottom, make the bottom deform. That's why then, when the bottom deforms will swollen, become a ball shape, then stop the rivet coming out. So this metal usually is a little bit soft, mostly maybe aluminium. So this is relatively weaker than steel, that usually the bolt and screw is made of, so it will easier -- less stronger than the steel screw and the steel bolt.
MR SHIEH: When you say "make the bottom deform", you mean make the bottom of the rivet deform?
A. The bottom of the rivet deform.
Q. Expand?
A. Expand, yes.
Q. So it can't be pulled out of the shaft, of the space?
A. Correct. Yes.
MR SHIEH: Mr Chairman, you asked for a photograph of the opening mechanism.
THE CHAIRMAN: The latch on the window, yes.
MR SHIEH: The latch on the window. There is one, not a close-up one, but if we can look at marine bundle 1,

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page 134. At the bottom one, photo 14, we can see, if we were to do a close-up -- at a distance, we can see the catch. It's not a close-up, unfortunately.
THE CHAIRMAN: But the vessel is still on the hard, is it not? Lamma IV is still on the hard, in the dockyard?
MR SHIEH: Yes.
THE CHAIRMAN: So this can be done now.
MR SHIEH: Is Mr Chairman thinking of doing an immediate inspection?
THE CHAIRMAN: Someone could take a photograph and describe the mechanism for us.
MR SHIEH: Yes.
My understanding is that different openable windows may have different catch mechanisms, because if we look at police album --
THE CHAIRMAN: Well, there's no need to get bogged down in this now. The subject could be addressed, because it is an issue.
MR SHIEH: Yes.
THE CHAIRMAN: We have people that have been described as banging on windows and blowing on whistles to get people to come and rescue them. So it's important that we're informed about the nature of the sliding windows.
MR SHIEH: The ease with which they could be opened. Perhaps we could call upon those representing Mardep to

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make arrangements for inspection to be made immediately and photographs to be taken.
THE CHAIRMAN: Mr Mok?
MR MOK: We will follow up on that.
THE CHAIRMAN: Thank you. That would assist.
MR SHIEH: Thank you.
THE CHAIRMAN: Before we leave that topic, was there anything in the cabin that marked the window as a sliding window?
A. No.
THE CHAIRMAN: Any signs saying "Sliding window" or ...
A. There's no sign but it can be easily recognised just by looking at it.
THE CHAIRMAN: Because the latch is in the middle of the window?
A. Yes, correct.
THE CHAIRMAN: But no sign?
A. Yes, no sign.
MR SHIEH: Thank you. While we are on this topic, marine bundle 1, page 134, which we have just looked at, just to illustrate the point. For the openable window, there's a catch in the middle; whereas the window next to it, there's no catch. So passengers would know that this would not be a window that could be opened?
A. Yes.

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Q. If you turn over to page 136, this was taken during an inspection on 16 October. In the middle photo, we can see the way in which some screws were found actually bent. This is not one of the dates of your inspection, but did you notice any screws detached which looked like that?
A. You mean with a bended head?
Q. Yes.
A. No. I didn't make a detailed examination of all the screws found in the upper deck cabin. I just took a look and reviewed some screws, but not examine all. So I cannot confirm this.
Q. Fair enough. Because there were probably too many loose screws around.
A. Yes.
Q. There are quite a number of photographs of loose screws.
Could we now come back to your written report. Paragraph 3.6.5, page 371:
"Near the centre of the cabin was a supporting column, of which the mounting holes of the base were empty with its bolts/screws missing ..."
For a photograph, we can find it at page 395, at the bottom. That is the support column; correct?
A. Correct.
Q. There was a deformed mounting hole, but the bolts and

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screws were loosened. You said they were loosened. When you inspected them, they had already gone; correct?
A. Yes. Missing.
Q. That's why you could only take a photograph of what remains, with the holes?
A. Yes, correct. So I did not know what kind of device used to affix this column. It may be bolt or screw. But I cannot confirm.
Q. Thank you. Could we now go back to your report and move on to --
THE CHAIRMAN: Could you help us as to where this was inside the vessel by reference to one of the plans/designs?
MR SHIEH: Dr Cheng, you have the police album and also marine bundle 1 in front of you.
THE CHAIRMAN: You say it was near the centre of the cabin. Was it --
MR SHIEH: Look at page 165 of the police album. Page 165 or page 164; I think either will do.
A. Yes, this one --
Q. Yes.
A. Yes, that is the column next to the life jacket.
Q. The handrail? The handrail?
A. Yes, the handrail. Correct.
Q. The cursor can point to the --
A. Yes, this one. Correct.

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THE CHAIRMAN: The large one that goes from floor to ceiling?
A. Correct.
MR SHIEH: Mr Chairman, as also depicted at page 164.
THE CHAIRMAN: Thank you.
A. Yes, the same one, this one. Correct.
MR SHIEH: Page 164, we can also see that, and also page 163. That is the one, correct?
A. Correct.
Q. Because if we compare that with page 395 of the expert bundle, we can actually see the metal railing next to it.
A. Sorry, can you repeat?
Q. If we look at page 395, you can actually see the metal railing next to it, so that corresponds with the relative location where this was found --
A. Yes.
Q. -- next to the handrail --
A. Yes, correct.
Q. -- for the staircase, which leads down to the --
A. Yes, to the main deck.
THE CHAIRMAN: So the end result was that nothing remained of whatever might have secured this floor-to-ceiling column holding it in place on the floor; nothing remained?

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A. Correct.
MR SHIEH: We now move to the weather deck in your report. That is paragraph 3.7.
Mr Chairman, the search for the deck plan still continues.
THE CHAIRMAN: Yes. Thank you.
MR SHIEH: "Half of the weather deck by the upper deck cabin was covered with awning. The weather deck had a pair of about 2-metre long benches with backs against each other along the centreline. In addition, a short bench was found along the edge of the weather deck on the starboard side. The benches were also secured to the deck via similar mounting plates and screws for the seats in the upper deck cabin. Two mounting plates and their screws were found to have been detached from the deck."
Perhaps we can look at police album III, page 167. This shows the weather deck.
A. Agree.
Q. Now, the awning is -- you see the blue material near the deck?
A. Yes.
Q. That formed part of the awning?
A. Correct.
Q. In fact the whole metal structure?

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A. Is the awning.
Q. The awning?
A. Yes.
Q. But what remains is the bare structure. What was supposed to be there may be by way of the blue materials --
A. Yes, covering it.
Q. Might have been destroyed or gone, and what's left is the blue material that remains?
A. Yes.
Q. "... a pair of about 2-metre-long benches ..."
That is the one that we see still remaining in the middle --
A. Correct.
Q. -- with the wooden back. That's what remained intact; correct? They were still attached?
A. Correct. But from this photograph, we still can see the leg on the left-hand -- yes, this one -- already detached from the floor.
Q. So does that correlate to the last sentence of your paragraph 3.7.1?
A. Correct.
Q. -- when you say:
"Two mounting plates and their screws were found to have been detached from the deck."

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A. Correct.
Q. So that is one mounting plate?
A. And this mounting plate is similar to the one used for the seat in the main deck cabin and the upper deck cabin.
THE CHAIRMAN: Do you have a close-up of this failed supporting -- or attachment?
A. I have a close-up of this photograph.
THE CHAIRMAN: In your own bundle?
A. Yes, my own bundle.
THE CHAIRMAN: Yes. Be kind enough to pass it to us.
(Handed).
Thank you. Yes, that shows it graphically.
You say there were two of these attachments that had failed. Does your photograph show the other one? I'll return it to you.
A. Yes, can I take a look?
It should be the one on the same photograph, this one (indicates), but it is not very clear. But at the time of my examination, I'm quite sure.
THE CHAIRMAN: Just hold it for the moment. The one that you drew our attention to first of all, is that the one on the bottom right?
A. Yes, correct.
THE CHAIRMAN: Where is the second one in relation to bottom right?
A. Yes. In this photograph, you can see two legs. The largest one is very obvious, detached from the floor. The one behind it is also a little bit raised up, above from the floor.
THE CHAIRMAN: You're looking at the bottom right photograph?
A. Yes, bottom right.
THE CHAIRMAN: Thank you.
MR SHIEH: Mr Chairman, could that be scanned, copied and distributed?
THE CHAIRMAN: Certainly. We'll have another look at it and make sure we're doing the right one.
Yes, we'll have that scanned and added to Dr Cheng's material.
MR SHIEH: Dr Cheng, because we only have this photo on the screen for the time being, just to identify the two plates which you noticed to have been detached, the first one, the more serious one, is the one closest to us; right?
Move down the cursor. Yes.
A. Yes, this one, correct.
Q. This is the one which is most obvious?
A. Correct.
Q. The other one is --

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A. In the middle. Yes, this one.
Q. Yes, thank you. So these two were the ones that you found detached from the deck as described in the last sentence of your paragraph 3.7.1?
A. Correct.
Q. But when you say the mounting plates were detached, were the screws still there?
A. The screws still attached to the mounting plate.
Q. But in a loosened manner?
A. It may be, I remember, because the paint, the deck paint was blue and the paint act like a glue, still hold the screw on the metal plate.
Q. Thank you. I think it will become clearer when the photos come out.
THE CHAIRMAN: Yes, I think so.
MR SHIEH: Can we move on to your paragraph 3.7.2:
"Two dislodged rows of seats, respectively having five connected seats and two seats, were found on the weather deck. The rectangular mounting plates of the legs were found to agree in appearance with those of the seat in the upper deck cabin. The mounting plates of the seats were found to agree in relative positions with the rectangular imprints on the deck, suggesting that the two rows of seats could have originated from the upper deck cabin."

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Now, one row had five connected seats, and the other row had two seats; correct?
A. Correct.
Q. We can see the row with the five connecting seats on page 167 of police bundle. If we move to the right.
On the right-hand side of this photograph --
A. Correct, this is --
Q. -- we can see that is one of the two dislodged row of seats, right --
A. Yes.
Q. -- consisting of five connected seats?
The two seats can be found on the next page, 168. Can you see the two seats connected, which stand upright?
A. Correct.
Q. So that represents the two seats; correct?
A. Yes.
Q. In the rest of this photograph, you describe your matching exercise, matching the plates and what remained, the imprint on the floor --
A. On the deck, yes.
Q. -- on the upper deck?
A. Correct.
Q. So these could have originated from the upper deck cabin, but indoors?

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A. Correct.
Q. Paragraph 3.7.3:
"A piece of fibreboard fragment roughly triangular in shape, having deep blue, red and white paintwork and measuring about 1.6 by 2.4 metres, was found on the weather deck."
For that we have your photo 29, which is page 396. That, we have looked at. That represents the missing piece from the port bow of the Sea Smooth.
A. Correct.
Q. Just to remind us all, it's page 384, the top of the page.
That's the triangle?
A. Yes, photo 5.
Q. Yes. Paragraph 3.7.4 of your report at page 372:
"The weather deck was paved with blue plastic flooring and the edge of the deck painted in white. The blue and white paint fragments recovered from Sea Smooth were found to agree in colour with the corresponding paint on the weather deck of Lamma IV."
THE CHAIRMAN: We have the photographs now, dealing with the centre bench and the two failed attachments. (Handed).
MR SHIEH: Thank you.
THE CHAIRMAN: There is a scanned version, if that could be put up on the screen.

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MR SHIEH: Thank you.
The bottom right-hand corner shows the two metal plates that were detached, one more seriously than the other; correct?
A. Yes, correct. So you can see the two screws still -- we can see underneath the mounting plate.
Q. And the paint is probably acting as some kind of glue, as you said --
A. Yes, that's --
Q. -- to keep the screw in place.
A. So you can see from the top, we cannot see the screw head. Covered by the paint.
Q. Thank you. The other metal plate on the top left-hand corner of this photo was also detached, but not as seriously.
A. Not serious, yes.
Q. I think for the rest of this series of photos, they are simply photographs of the attached benches and the detached five chairs taken from different angles.
A. Yes.
Q. Because the top right-hand corner, for example, shows the same five detached chairs that we have seen in another album.
A. Correct.
Q. Thank you. As a matter of interest, what is that

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picture on the top left-hand corner of this page? Because it shows the floor breaking rather significantly. The top left-hand corner of this photo.
A. It is the close-up of the middle leg.
Q. Close-up of the middle leg?
A. Yes, and you can see the screw already a little bit loosened from the mounting hole.
Q. I see. When you say this is the middle leg, this is actually the same as the leg which is not so prominent on the bottom right-hand corner?
A. Oh, sorry. Mr Chairman, I need to clarify. Please move to the bottom right photo.
Q. Yes.
A. That leg should be the other leg. It is a little bit loosened. But what I mean, already detached, should be the one on the top left corner. Because I can see the screw already loosened from its mounts, this one. So I'm referring to -- my report said two mounting plates already detached, it's this one, the one now we can see on the screen and the one in the bottom right corner, these two.
Q. I see.
A. Yes. This one is more obvious.
THE CHAIRMAN: So if we're looking at the bench standing at the stern, the bench is in the middle of the vessel and

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the first one that failed was the port aft mounting.
A. Port aft, yes.
THE CHAIRMAN: Where was the second one?
A. On the port middle.
THE CHAIRMAN: Middle?
A. Yes.
THE CHAIRMAN: So port aft, port middle, of the three on the port side?
A. Correct, yes.
MR SHIEH: Could we have the entire page.
Just to clarify, the picture on the top left, that is the mounting plate corresponding to the leg on the port middle?
A. Yes. So we can see on the bottom left corner, the photo, we can see the leg --
Q. Yes, the cursor is now pointing at the port middle leg.
A. Yes. We can see the colour, the paint near the leg already peeled off, agrees with that one on the top.
Q. Thank you. And the one on the bottom right-hand corner is the port aft?
A. Correct.
Q. Dr Cheng, we were looking at the blue and white paint fragments that you referred to at paragraph 3.7.4 of your report. Just to confirm, those fragments, you are referring to the ones that we can find at page 384, top

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of the page. There are numerous coloured fragments that we can see.
A. Correct, yes.
Q. Life-saving apparatus -- we move on:
"A life raft ... was found on the dock by Lamma IV. An empty rack probably for the container of a life raft was found on the starboard side of the weather deck.
There was a detached white rack of about 0.9 metres high lying on the weather deck. The base of the rack was found to match with the voids situated aft of the weather deck, indicating that the white rack was likely detached from there. Making reference to the deck plan ... the rack was used to hold lifebuoys. Only 6 lifebuoys were found on board."
A. Correct.
Q. There isn't any photograph that we can find which depicts the raft or the racks in your album. Is there one in the police album that you can find which could help us?
A. Yes.
Q. There were some lifebuoys which we can find in the weather deck.
A. In photograph 172, page 172.
Q. Photograph 172?
A. Page 172.

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Q. Yes.
A. We can see the white rack which are supposed to be used to hold the lifebuoys.
Q. Thank you. And the cursor can point to the white racks.
A. Above the fragment.
Q. Yes, here.
A. Upper.
Q. Further up, further up.
A. Further up, yes, this one. This is the rack, the white rack.
Q. We can actually see that on the model as well.
At paragraph 3.8.3:
"Beneath some seats of the main deck cabin were strong orange plastic bags, the life jacket stowage ..."
The photograph is at page 396. So beneath some seats we find life jacket stowage like this; correct?
A. Yes.
Q. But some seats only?
A. Yes.
Q. "... measuring about 35 cm high, 25 cm long and 15 cm wide, some of these carrying on orange life jacket, which was contained in a tied white garage bag."
That we can find at the next page, page 397.
So inside each of those orange bags you would find a rubbish bag, a garbage bag, which contained the actual

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life jacket inside?
A. Correct, and have a knot.
THE CHAIRMAN: Just dealing with the orange pouch, that was attached with a Velcro strip, was it, to the longitudinal beam of the seat immediately beneath the plastic seat?
A. Yes.
THE CHAIRMAN: So in order to open it, the Velcro strip had to be opened --
A. Removed, yes, opened, correct.
THE CHAIRMAN: -- from that place?
A. Removed from the column. Because the whole jacket, the thickness of the whole jacket, should be about 20 cm. And the opening in line with the seat, the opening of the orange bag, just only 10 cm. So first, if we need to take out a life jacket, first we need to remove the Velcro. And then the opening is large enough, then we can take out the life jacket contained inside garbage bag.
THE CHAIRMAN: How long was the Velcro strip that had to be opened in order to effect entry to where the life jacket was contained?
A. I do not know how long is it, but easy, in my opinion.
THE CHAIRMAN: Easy to open it?
A. Yes.

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THE CHAIRMAN: But not so easy to get to, because you only had a 10 cm gap beneath the seat to get to the Velcro?
A. Yes, correct.
THE CHAIRMAN: Is that it?
A. Yes.
THE CHAIRMAN: Thank you.
MR SHIEH: And the point about the width of that gap is really the point that you made in the last part of paragraph 3.8.3 of your report: you can't just pull out the life jacket, because it is too thick, you really need to loosen the strap. That's really the point that you are trying to make at the last part of your paragraph 3.8.3; correct?
A. Correct.
Q. For better photos of the way in which these life jackets were actually stowed, could you turn to police bundle V at page 319. Is that the way in which they were actually stowed?
A. Yes.
Q. I think over the page, 322, is a reasonably clear depiction as to the way in which these bags were effectively hung on that frame under the seats. One can visualise the gap. Is that the sort of appearance?
A. Correct.
Q. Thank you. At pages 323 and 324, we have a photographic

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depiction of various stages after the Velcro had been loosened.
A. Yes.
Q. Page 323 leading on to page 324. Page 324, the Velcro had been loosened --
A. Correct, yes.
Q. -- and so a garbage bag fell out.
Despite diligent searches, we were not able to find a photograph of the deck plan or any photograph of the deck plan that was taken on board the Lamma IV. But again, the Lamma IV is still --
THE CHAIRMAN: Yes.
Did you take one, Dr Cheng, of the layout that was displayed in the notice on the wall?
A. Let me -- actually, that plan I'm referring is this one I have seen in the court, this (indicates).
THE CHAIRMAN: Did you see one in the vessel as well?
A. Yes.
THE CHAIRMAN: On a wall, attached to a wall?
A. Let me check whether I took a photo of this one.
MR SHIEH: If photographs are to be taken of the catch of the sliding windows --
THE CHAIRMAN: Yes, this could be done. I'd be very surprised if there isn't a photograph somewhere of this.
MR SHIEH: As I say, the search will obviously still

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continue, but if there could be a shortcut, such as a photo taken on the spot --
A. Chairman, maybe I provide this photograph in the afternoon when I get the photo from my colleague.
THE CHAIRMAN: Thank you.
MR SHIEH: Thank you.
Dr Cheng, moving on to paragraph 3.8.4 of your report:
"Only one type of life jackets was found in Lamma IV, which was the one shown on safety instruction notices for donning a life jacket. A total of three notices of donning instructions, showing how to don a life jacket, were found inside the passenger cabins ..."
For the photo, let's look at page 397. That's a sort of instruction sheet.
A. Correct.
Q. There is another one in police album V, page 318. So all these instructions, they look the same, right? The same document posted in three different locations?
A. Correct.
Q. Thank you. Page 373 of your report:
"The donning instructions were printed in both Chinese and English ..."
We see what they look like now.

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"No children's life jackets was found on the vessel."
That is uncontroversial.
"At the time of my examination, a total of 98 life jackets were found on the vessel.
At least 6 and 4 exit signs, denoting the location of the nearest emergency exit, were found in the main deck cabin and the upper deck cabin respectively. In addition, imprints agreeing in size with the exit signs were noted in the two passenger cabins, which suggests that some exit signs might have been posted on these positions but were detached."
If we look at page 398. The exit sign circled in red at the top, you can see there's an arrow on the exit sign pointing at where the emergency exit was.
A. Yes.
Q. The green circle showed an imprint. Quite obviously it's a different shade of colour --
A. Correct.
Q. -- than it's surrounding and therefore shows something must have been attached there for some time before being taken away.
A. Correct. And the size agrees with the exit sign on the right now the cursor pointed to.
Q. Yes.

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A. So my opinion is that this similar exit sign may have been posted here, but detached.
Q. Yes. Because if you look at the right-hand corner, because it's similarly oblong-shaped.
A. Shape, and the position also agrees in height.
THE CHAIRMAN: As far as the life jackets found on board were concerned, did they have the name of the vessel written on them? Perhaps to help you, if you could have a look at miscellaneous bundle, page 87. It's the photograph on the top right that helps us on this issue. If we can rotate that so we can read the name.
At least this one has its name stamped on it.
A. Correct. But I did not inspect this one at the time of my examination.
THE CHAIRMAN: Thank you.
MR SHIEH: Dr Cheng, when you looked at the garbage bags which contained the life jackets -- perhaps we can take a look at the photographs.
THE CHAIRMAN: There's one on the screen right now.
MR SHIEH: Yes.
Did you notice or try to see the ease with which any knots could be untied? You see, because if there's dead knot, "(Chinese spoken)", then it may be difficult to pull it apart, whereas if it simply opened --
A. At the time of my examination, I could easily untie it.

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THE CHAIRMAN: You could certainly easily rip it open.
A. Yes. It's quite thin. Correct.
MR SHIEH: We move on to navigation lights at page 373 in your report. Paragraph 3.9.1:
"... a pair of sidelights installed on the roof of the upper deck; the sidelight on the starboard side was green and that on the port side was red. The mast ... was found detached from its anchorage point. The mast had an all-round navigation light and a masthead light (see photo 34)."
That's at page 398. The light that is nearer to us is the navigation light; correct?
A. Correct.
Q. The one slightly on top is the masthead light?
A. Correct.
Q. Thank you.
"The housings of the green and red sidelights were round intact, but traces of water were found inside them. The light bulb of the red light was found broken and that of the green light snapped in the middle.
The housing of the masthead light was wet and its light bulb was found snapped. The housing of the all-round navigation light was found jammed and the light bulb inside could not be examined further.
Another light housing mounted on the transom was the

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stern light, which was heavily covered with mud. No further examination was conducted ..."
Then you deal with simulation of detaching a seat.
"According to police information, the upper deck cabin should have seats as shown in the deck plan before the accident, but all the seats, except the one as described in paragraph 3.6.2, were detached from their mounts. To determine the force needed to detach ... the row of two connected seats on the weather deck was used for the simulation. The two seats were mounted on a single metal frame with four legs each having a mounting plate, so a total of eight screws, which were collected from the upper deck cabin and examined free of any thread damage, were used to secure the seats to the fibreboard deck of the upper deck cabin."
So the experiment that you did was that you picked up the pair of white seats that were lying on the weather deck?
A. Correct.
Q. The ones that we could see, for example, at page 168 of police album III?
A. Yes, these are the two connected seats, the two.
Q. That you used to do your experiment?
A. Correct.
Q. The two seats -- how many legs were there?

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A. A total of four.
Q. Total of four legs. But each leg would be attached to a metal plate? Each metal plate would have two screws, so altogether eight screws; correct?
A. Correct, and the screw was recovered from the upper deck cabin and I have examined the screw, which free from damage.
Q. Yes, "free of any thread damage, were used to secure the seats to the fibreboard deck of the upper cabin".
So that's the indoor, right?
A. Correct.
Q. You picked up the two detached seats from the weather deck, you took it indoor --
A. Correct.
Q. -- upper deck, and you found a corresponding location where you can fit --
A. No, no. I fit it in a new location. I do not use the previous mounting hole. Because that hole, in my opinion, already deformed. So I make a new hole on my own.
Q. So you used an electric screwdriver --
A. Correct.
Q. -- to create eight new holes?
A. By ratchet -- I don't need to make a hole. Just use a -- screw it down, yes.

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THE CHAIRMAN: These are self-tapping screws?
A. Correct.
MR SHIEH: Using existing screws that you found lying around which were still useable, intact, without damage?
A. Correct.
Q. One "of the backs of the seats was found slightly damaged and cracked."
That is simply a description of the state it was in when you discovered it; correct?
A. Correct.
Q. Because that was before you did the experiment. Then paragraph 3.10.2, you did the experiment.
A. Correct.
Q. "... pulled horizontally towards the stern by a ratchet tightener which force was monitored by a calibrated balance. The first test was conducted by pulling a piece of webbing tied near the top of the seats."
So that would be to the plastic?
A. Yes, the plastic part, the upper part.
Q. To the plastic part?
A. Yes.
THE CHAIRMAN: Around the whole seat?
A. Around the back, the back of the seat, on the upper part. Then I put webbing around this position (indicates).

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THE CHAIRMAN: So it encompassed the seat?
A. Yes, encompassed the two seats.
MR SHIEH: Both seats.
A. Both seats.
Q. Because I noticed you used the plural, therefore it is the case where you wrapped it around two seats.
A. Correct.
Q. Thank you.
"... but the test was aborted when the pulling force reached about 110 kilograms due to the start of yielding of the originally damaged back of the seats."
So you did a second test. So the first test was inconclusive because you had to stop halfway through?
A. Yes, correct.
Q. "The second test was then conducted by pulling the top of the seat frame."
So this time the metal part?
A. The metal part, correct.
THE CHAIRMAN: Was that underneath the seat?
A. Correct, underneath the seat.
MR SHIEH: "When the pulling force reached about 190 kilograms, the row of seats was detached from its mounts."
Then at paragraph 3.10.3, you describe:
"Another test by pulling the only single seat in the

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upper deck cabin ..."
That's the surviving one outside the wheelhouse?
A. Correct.
THE CHAIRMAN: Before you move on to that, the second test, when you attached the webbing, presumably --
A. Yes.
THE CHAIRMAN: -- attached to a metal bar that connected both seats?
A. Correct.
THE CHAIRMAN: Thank you.
And did you pull from the middle of the two seats?
A. Yes, the middle.
THE CHAIRMAN: And they were dislodged at about 190 kg?
A. Correct.
MR SHIEH: "Another test was conducted ... the seat was found to be detached from its mounts at ... 230 kilograms."
So when you did your test on the surviving seat outside the wheelhouse, the amount of force required was 230 kg. This was done by pulling the metal seat frame, so the same type of experiment you did in respect of the two seats that you described in the previous paragraph?
A. Yes.
Q. Thank you.
"The mounting holes ... were examined, and they were

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found to agree in appearance with the other mounting holes found on the deck."
At this juncture, could I ask you to look at some comments made by Dr Armstrong on the tests.
A. Okay.
Q. Could you look at the same bundle at page 475.
You've had a chance of looking at this paragraph, have you?
A. Yes, I read it yesterday.
Q. I think Dr Armstrong was commenting not so much on the experiment that you -- what do you say to this paragraph, because Dr Armstrong says:
"Dr Cheng measured the forces necessary to break the remaining seat in the upper deck cabin from the deck, as indicated in his report paragraph 3.10. I would like to highlight that this way have been the only remaining chair because it had the strongest attachment to the deck, and therefore all the other chairs broke off at a possibly much lower value than the 190 kg that was measured."
I think there might have been a mistransposition of the figures, because when you did your experiment on the single remaining seat, the force required was actually 230.
A. Yes, this is the reading I measured. And also, I agree

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with Dr Armstrong on this point, that first of all, for the experiment I conducted with the two seats, since the mounting hole was freshly made and because the deck was made up of fibre, my opinion is that over time, the mounting hole might deform over time.
THE CHAIRMAN: You saw examples of that, did you not? 10 seats where they had been rescrewed?
A. Yes. Yes, that is -- exactly, that is the point like that. I believe that over time, the mounting actually have some physical evidence on the deck that have been deformed. If that seat remained, if I pulled that seat originally mounted on the deck for some time, the force should be lower. So my opinion is that 190 kg may be near the maximum. And it should be noted that when we're talking about the force of 190 kg, we are talking about pulling at the frame, the metal frame.
THE CHAIRMAN: Yes. Not at the top of the seat.
A. Yes. If we pull at the top of the seat, just because of the principle of lever, the force --
MR SHIEH: Less force would be required?
A. Yes. So I have a record in my statement that it should be reduced. So if we just make a calculation, depends on my experiment. If the pulling force to detach the two seats is 190 kg, if I pull it at the back of the seat, should be reduced to about 110 kg, as recorded in

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my statement, paragraph 3.10.2. Sorry, should be --
Q. Because your 3.10.2 --
A. Sorry, I made a mistake. Should be --
Q. It's later on, I think.
A. In the analysis, paragraph 5.6, I go a little bit further.
Q. Yes. Page 377.
A. Yes. My report, page 377.
Q. Yes, internal page 16.
A. Yes.
Q. Because you do a distinction between pulling at the bottom frame on the one hand, and evenly exerting the force on the seats on the other hand?
A. Correct, yes.
Q. Because in real life, the force would be likely to be exerted by people sitting on the chairs or pulling at the back?
A. Correct.
THE CHAIRMAN: If that's not inconvenient, Mr Shieh, we'll take our morning break now.
MR SHIEH: Yes.
THE CHAIRMAN: Dr Cheng, we're going to take a 20-minute break now.
A. Okay.
THE CHAIRMAN: Be kind enough to be back in your seat so we

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can resume in 20 minutes.
(11.33 am)
(A short break)
(11.55 am)
THE CHAIRMAN: Mr Shieh.
MR SHIEH: Dr Cheng, can I just explore one or two points in Dr Armstrong's report about chairs with you.
First of all, in relation to the experiment that you conducted on the remounted seats, which you did with the pair of chairs -- you remember the pair of detached chairs from the weather deck that you took in and you screwed them in afresh?
A. Correct.
Q. I think before the break you told us that effectively it might not actually represent the degree of resistance the actual seats would have to force, simply because for the actual seats on the deck, they would have been mounted for some time already, whereas for your experiment the seats were actually newly mounted; is that the point that you are trying to get across?
A. Yes, correct. Yes. And from the deck, I found some hole, the mounting hole on the floor was larger, and I have found some sign of deformation. So I would expect if the screw detached from that deformed hole, the force will be lesser.

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Q. The second point you brought out before the break was the point about the location where the force was applied, and that was a point you brought out in your "Analysis" section, namely it's simply a matter of physics: if the point is applies at a point further away --
A. Further up, then the force required to detach the seat is lesser.
THE CHAIRMAN: So people standing on the top of the seats in order to keep their heads out of the water would apply more force than someone sitting on the seat?
A. Correct.
MR SHIEH: There is actually a third point which is made by Dr Armstrong in the relevant part of his report, and that is to say, the force that you would need to detach the single remaining seat outside the wheelhouse might not be representative of the sort of force that would be needed to detach the other seats in the upper deck.
I think Dr Armstrong gave a reason, that the single remaining seat might have remained simply because it had the strongest attachment, so therefore it might not actually tell you a lot about the other seats.
A. I agree.
Q. You agree. Secondly, Dr Armstrong went on to say that you have to consider the matter in the context of the

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varying consistency and physical properties of the fibreglass spread over the upper deck. Would you also agree with that?

If you look at Dr Armstrong's second report at page 475, at the fifth line from the top, he said:

"A factor that must be considered is that the deck material had varying consistency and physical properties; specifically it was made with internal 'shear webs', meaning the foam core of the structure was compartmentalised into roughly 100 mm x 100 mm 'boxes' by internal vertical fibreglass. There is no visual indication by looking at the deck where the internal shear webs may be located, and if a seat foundation screw was to be fitted close to or into a shear web it would be able to hold a much larger load. This may be the reason why the single chair foundation was undamaged."

Did you have any comment on that?

A. I did not make a detailed examination of the fibreboard by myself, so I have no comment on this and I cannot disagree with Dr Armstrong.

Q. Thank you. Can we now move on to your report at page 374 of the bundle, when you dealt with the laboratory examination.

At paragraph 4.2, you set out the paint samples that

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you collected from Lamma IV and Sea Smooth.

A. Yes.

Q. You went on to describe the comparison or the paint examination that you conducted. Put on a very high level of generality, basically the purpose of the exercise is to match up fragments that were found on one vessel, to see whether or not they could have come from contact with a certain part of the other vessel?

A. Correct.

Q. And the results of the paint examination -- paragraph 4.5.1:

"The recovered blue, red and white fragments from Sea Smooth ..."

I don't think we need to turn up that particular page again, but those fragments are those we found at the foredeck?

A. Yes.

Q. The scattered pieces we saw in one of the photographs.

A. Correct.

Q. "-- were found to agree in colour and chemical composition in the top layer of the corresponding control paint samples taken from Lamma IV, indicating that the respective samples could have originated from the same source."

And the corresponding samples from Lamma IV were

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taken from the weather deck on the port side; correct?

A. Correct.

Q. And also the red paint from the U-shaped pipe-mounting bracket on the port side.

Paragraph 4.5.2:

"The recovered deep blue smears from Lamma IV were found to agree in colour and chemical composition with the control paint sample taken from Sea Smooth, indicating that the respective samples could have originated from the same source."

I want to follow through. The deep blue smears from Lamma IV are to be found at page 387 of the bundle, at the bottom part; is that correct?

A. No, I collected from on the passageway of the gash.

Q. Oh, I see. I thought you were talking about the deep blue ... Passageway of the gash, that would be page 390 at the top?

A. Correct.

Q. That corresponded with the control paint sample, GPW 12839; that is the blue paint sample from the port side hull of the Sea Smooth --

A. Yes.

Q. -- indicating that the paint that you found on the gash corresponded with the paint that you --

A. Port bow of Sea Smooth.

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Q. -- would find on the port bow of the Sea Smooth?

A. Yes.

Q. We move on to "Bulb Examination" at paragraphs 4.6 and 4.7. Various bulbs were delivered to the laboratory, and the purpose was to determine whether various filaments of the bulbs were illuminated at the time of the accident.

The results, paragraph 4.9.1:

"The glass bulbs and the filaments of the red light, the green light and the masthead light were all found broken. Numerous white/black powders were found deposited on the inner side of the glass bulbs and the contact wires. These findings, together with the scene observation that water was found inside their respective housings, indicate that the filaments of the light bulbs could have been illuminated when the glass bulbs were cracked probably due to water ingress into the housings of these navigation lights."

One point I wish to clarify with you is how is it possible to conclude from the existence of powders deposited from the inside, and also the fact that water was found inside their casings, how would this enable you to form a view whether they were actually illuminated as of 8.20 pm on 1 October?

A. If the filament was on at the time of the accident, that

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means the filament will become very hot. At that time, if the glass bulb was broken and water coming inside, then the filament, that is made of tungsten, will immediately have a reaction, oxidation, then will result in the formation of some tungsten oxide, which is white powder, which will deposit inside the glass bulb. If the filament is cool, that means just a piece of metal without heating, without turning on, even if the glass bulb was broken and the water came inside, there will be no reaction. So it will appear as a shiny filament.

So the presence of white powder on the filament indicates that at the time of the glass bulb breaking, it is hot. When it is hot, it means it could have been illuminated.

Also, because the housing of the sidelight was intact, so how could the glass bulb was broken? It's probably because the glass bulb was very hot. When the water coming inside and cool down, due to the temperature difference, the glass bulb cracked. So this is another finding which supports the glass bulb of the sidelight was illuminated at the time of the accident.

Q. From what you said, the formation of tungsten oxide was the result of a chemical reaction caused by water getting into the bulb; correct?

A. With a hot filament.

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Q. Hot filament, with hot filament. Therefore the existence of the powder inside the bulb, which you took to be tungsten oxide --

A. Correct.

Q. -- it could not have been the result of the bulb being in use on some prior journeys, right, because it could only have been the result of the breakage of the --

A. Yes, correct.

Q. -- bulb, with water going in, reacting with hot filament?

A. Correct.

Q. Have you done any test on the powder to ascertain that it in fact is tungsten oxide, the result of chemical reaction?

A. Because I have quite a lot of experience on examination of light bulbs from traffic accident cases, and I have done similar examinations before, and all the results agreed that it's tungsten oxide. So from my experience, I did not do a detailed examination of that white powder.

Q. Thank you. In other words, that is the sort of thing that is taken for granted in your area of expertise, so you don't actually have to do a separate test every time --

A. Correct.

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Q. -- when you deal with a tungsten filament, seeing powder of that nature?

A. Correct, yes.

THE CHAIRMAN: Do you have photographs of the bulbs that we could look at?

A. For the light bulb? Yes, I have.

MR SHIEH: Could we see it, and maybe that could be scanned as well.

THE CHAIRMAN: Photographs that illustrate this point about the tungsten oxide powder.

(Handed).

So it's the white powder that's attached to the damaged filament that is what you're describing as the tungsten oxide?

A. Correct.

THE CHAIRMAN: Yes. Perhaps that could be scanned and copied and we'll take that as an extra photograph. Perhaps you'd show counsel first.

MR SHIEH: Tungsten oxide is white in colour?

A. Yes, mostly white.

Q. Mostly white. What would the black powder be? Because you talked about "numerous white/black powder".

A. Sometimes it is some -- just the non-reacted tungsten vaporises and will deposit on the cold surface.

Q. Thank you. But the important feature, the indicator,

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would be the presence of the white powder?

A. Yes.

Q. Because that illustrates the existence of tungsten oxide?

A. Correct.

THE CHAIRMAN: Sorry, I missed your explanation for the presence of some black particles. What causes the black?

A. It could be the tungsten vaporising during normal operation and depositing on the side. But for sometimes, if the oxygen inside the light bulb was consumed, then no more oxygen for the reaction, then the tungsten will deposit on the glass bulb, on some cold areas. But I think the white powder will be a much more stronger indication rather than the black, but this is the observation I find, so I just note it down.

THE CHAIRMAN: But it's the white one that you rely on for your opinion?

A. Yes, correct, and also the cracking of the glass bulb. Because I've said that the housing was intact, and the glass was firmly affixed on it. So it should be due to rapid cooling of the hot glass, otherwise the glass bulb wouldn't be broken.

THE CHAIRMAN: Yes. Yes, thank you.

MR SHIEH: I thought you mentioned unreacted tungsten

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earlier in your answer.
A. Yes.
Q. Unreacted tungsten which became vaporised and which resulted in --
A. Condensed, yes.
Q. -- the black powder?
A. Yes.
Q. Unreacted tungsten meaning the tungsten which had not undergone oxidation?
A. Yes. Maybe -- there are two causes. Maybe on this occasion, all the oxygen nearby was consumed, then no more oxygen for the oxidation. Or, maybe due to the normal operation of this glass bulb, some tungsten will vaporise due to the operation, because the tungsten -- the filament is very hot during the process. That's why sometimes the filament will fail, because -- maybe it's related to this. But my conclusion is drawn mainly based on the white oxide, the white powder.
THE CHAIRMAN: Thank you.
MR SHIEH: You mentioned your experience in conducting similar tests in traffic accident cases. You have to forgive my ignorance here: it's a rather conventional way when you investigate whether or not, let's say, headlights are on when you investigate a traffic accident; right?

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A. Correct. We need to determine whether the light was turned on or not because this relates to the cause of the accident.
Q. And you would describe this to be a rather routine and conventional type of testing, whether or not lights were on?
A. Yes.
Q. But that would depend on a process of rapid cooling, you said; right?
A. The breaking of the glass bulb.
Q. The breaking of the glass bulb was the result of rapid cooling?
A. Correct.
Q. Right. But the oxidation to form tungsten oxide was the result of influx of water?
A. Yes, and the hot filament reacting with the oxygen.
Q. Hot filament reacting with oxygen?
A. Yes.
Q. Right. Thank you. But that has nothing to do with water?
A. Yes. Hot filament reacting with oxygen, not water, correct.
Q. Because the water, the contribution of the water in this case, to cause the rapid cooling --
A. Yes, cause the cracking of the glass bulb, and then the

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oxygen inside will react with the hot filament to produce the tungsten oxide.
Q. Thank you.
Paragraph 4.9.2:
"No damage to the light bulb ... from the all-round navigation light was found. The filament was intact and the light bulb was found to be functional. I could neither confirm nor disprove whether the filament of the light bulb was illuminated at the time of the accident."
Because there was no cracking, and therefore the indications that you had examined for the sidelights were not present, and therefore you could not conclude one way or the other?
A. Correct.
Q. When you come to "Analysis", section 5:
"The results of forensic paint examination, the agreement in size and shape of the damage to the both vessels, the transfer of fibreboard panel of Sea Smooth's hull to Lamma IV, particularly the bow of the port hull of Sea Smooth, strongly indicate that Sea Smooth's port bow had come into contact with Lamma IV's port quarter."
Do you confirm that?
A. Confirm.
Q. Paragraph 5.2:

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"The gash on the port side passageway of Lamma IV suggest that the centrelines of the two vessels against each other at the moment of collision were at an angle of approximately 30 degrees."
At this point, I would wish you to consider Dr Armstrong's second report in the same bundle.
Before we do that, the photographs are now available. (Handed).
THE CHAIRMAN: Perhaps we could put the scanned photograph, so everyone can follow it, onto the screen.
MR SHIEH: Dr Cheng, if you look at the top right-hand corner of the recently scanned sheet, we have "Examination Worksheet. Issue date: 31 July 2012". That has nothing to do with the date of examination, that is simply because this standard work sheet was issued on this date; correct?
A. Yes.
Q. The actual date of examination was actually in November, right, because we can see that at the bottom of this page; correct?
A. Right.
Q. So these pictures were taken of what remains in a bulb found on Lamma IV.
A. Correct.
Q. The bottom photos show the white powder?

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A. Correct, deposited on the filament.
Q. Left and right?
A. Yes, both.
Q. Both depicted the white powder which you concluded to be tungsten oxide?
A. Correct.
Q. Thank you. That is the masthead light, my learned friend asked me to ask you to confirm.
In which lights were all these various filaments found? Because the lab reference is GPW 134 --
THE CHAIRMAN: Just give Dr Cheng a moment.
A. This is the masthead light.
THE CHAIRMAN: Did you take photographs of the starboard and port lights?
A. Yes, as well.
THE CHAIRMAN: Do you have those as well?
A. Yes, in the same file.
THE CHAIRMAN: Yes. May we see them.
A. Okay.
MR SHIEH: The relevant reference should be 13412 and 13413. This is 13415, which is the masthead.
THE CHAIRMAN: Take your time, Doctor, and choose the best example for us.
MR SHIEH: Just to confirm, the stern light covered in mud, that wasn't examined and therefore that didn't form any

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part of this analysis of the bulb; correct?
A. Sorry?
Q. The stern light, there is a separate stern light but because it was covered in mud, you did not conduct further examination; correct?
A. Yes, I did not examine.
(Handed).
THE CHAIRMAN: We'll have those two pages of photographs scanned and copied, and we can come back to that in due course.
MR SHIEH: Whilst that's being done, Dr Cheng, perhaps we'll continue with the report. I was about to ask you to look at Dr Armstrong's second report. Can you look at page 475 of the same bundle. In Dr Armstrong's second report, paragraph 9(d) --
THE CHAIRMAN: You're dealing now with the issue of the angle of collision?
MR SHIEH: Yes, correct.
THE CHAIRMAN: Thank you.
MR SHIEH: "In paragraph 5.2 and in his summary at 6.1 of his report, Dr Cheng comments that the two boats met at an angle of approximately 30 degrees. I would like to clarify that the measured angle of 30 degrees is not the angle at which the two craft met, because a geometric correction needs to be applied to allow for the relative

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speed of the two craft. According to my measurements, the angle of the gash in the deck of the Lamma IV was 30 degrees when taken down the centre of the gash, and at the inboard edge of the gash the angle was 28 degrees. These angles, when considered with the relative speed of the two craft, show that the two boats met at a difference in true heading angle of approximately 41.6 degrees, as discussed in my report in paragraph 15, and not at 30 degrees. The vector diagram is illustrated in appendix IV item 19, with Lamma IV moving at 11 knots 'up the page' and Sea Smooth moving at 22 knots from the top left towards the bottom right at an angle of 41 degrees. In this case they meet at a combined speed of 31.1 knots and an apparent relative angle of 28 degrees, but the true heading difference was 41.6 degrees."
The vector diagram is to be found at page 487.
A vector is simply a scientific term for a quantity with a direction?
A. Correct.
Q. Page 487 shows Dr Armstrong's analysis of the angle when one takes into account the relative movement of the two crafts.
First of all, let me put you in the frame. The speed at which they were travelling obviously is

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an assumption that is now being built in. Dr Armstrong proceeded on the basis of 11 and 22. Obviously some other exercise would be required to see whether those were indeed the speeds at which they were travelling.
A. Yes.
Q. But would you accept that with crafts travelling at speeds of that sort of order of magnitude, to ascertain the really angle where they met, some adjustments would have to be made to cater for their relative speed?
A. I have no knowledge on this, and I have no expertise in this area, so I cannot comment on this one.
Q. Thank you. So your measurement was simply the measurement of the angle of the gash, physically measured?
A. Correct. Yes, a physical measurement, and also because the gash is irregular in shape. So I used -- just depending on which edge I used. So the angle I report is approximately 30 degrees, and I think it agrees with what has been done by Dr Armstrong, 28, should be similar.
Q. Actually, 30 was the angle he took down the middle.
A. Yes, correct, yes. But because this is not a very -- how do you say? Just illustrates approximately the angle. There is no use to -- it is no use to accurately -- to document what is the exact angle, in my

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opinion. So that is why I just used about 30 degrees, and that's what my opinion is at the time of making this gash, the angle. So if we consider the whole movement, and my opinion also as well is that the angle of two vessels should be changing at the time, so it is quite difficult to explicitly say at what angle when the two vessels come together.

But this is the opinion, that the angle of the gash, and I projected it to the angle of the collision of these vessels. But please be reminded I did not consider the manoeuvre of the two vessels.

THE CHAIRMAN: So you're helping us as to the angle of the gash in Lamma IV?

A. Yes.

THE CHAIRMAN: 30 degrees?

A. Correct.

THE CHAIRMAN: Thank you.

MR SHIEH: Thank you.

We move back to the text of your report. This is the third line down, paragraph 5.2:

"The foredeck of Sea Smooth had breached the side panel of the main deck cabin of Lamma IV, and went in and reached the centreline of the main deck cabin, crushing the seats and the central unit of the air-conditioning system on the port quarter and causing

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collapse of a large piece of ceiling frame."

Pausing here. This basically is a summary of what we have seen, including this morning, Dr Armstrong's reconstruction showing the maximum point of penetration?

A. Correct, and I based on the blue paint smear on the roof to reach this conclusion.

Q. Thank you. Just so that we can identify the relevant part of the analysis with the detailed discussions we have had so far, this is the exercise I'm going through with you.

"At the same time, the bow of the port hull of Sea Smooth had pierced open the hull of Lamma IV ..."

So in terms of the relevant part of the two vessels we are talking about, the top six lines, we are talking about the foredeck and the impact it had on the --

A. Main deck, yes.

Q. -- main deck of the vessel. Now we are moving further down --

A. Correct.

Q. -- to look at the impact of one hull on the other one.

A. Correct.

Q. Thank you.

"... causing the slanted gash in the engine room at compartment D."

That's the diagonal gash that we've seen.

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A. Correct.

Q. The angle of 30, the angle --

A. Yes. No, the slanted gash.

Q. The slant is not 30, I know.

A. Yes, correct.

Q. "The strong force of collision had torn the fibreboard planking of the port bow of Sea Smooth apart. Then, Sea Smooth remained its forwards momentum and the broken keel, which was hardest part of the hull, further sideswiped the port side hull of Lamma IV so the gash on the hull of Lamma IV changed direction, running along the chine, leaving the set of smooth and continuous scratches on the hull of Lamma IV."

Now, for the broken keel, could I ask you to look at page 386. This depicts the port hull of Sea Smooth, with a huge part missing.

A. Correct.

Q. But we have seen from the photograph that there is a fragment from Sea Smooth, blue in colour, which was found embedded in the diagonal gash.

A. The gash, correct.

Q. From that, we could draw the inference or come to the conclusion that that broke apart --

A. And torn apart, yes.

Q. -- and was embedded. Part of that was actually embedded

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in Lamma IV?

A. Correct.

Q. And was causative of that gash?

A. Yes.

MR SHIEH: Could I pause here whilst we examine the latest photographs.

Mr Chairman, I suggest that with these latest photographs that have recently come in, they will in due course be allocated a page number and --

THE CHAIRMAN: Yes. They should be added to the photographs Dr Cheng has already produced.

MR SHIEH: Yes, part of the expert bundle, continuing onwards.

THE CHAIRMAN: Yes.

MR SHIEH: Dr Cheng, these are two extra sheets. If you can look at the laboratory reference at the bottom left-hand corner. Let's look at 13412 first. 13412 is the laboratory reference for the port side light bulb?

A. Yes.

Q. Do you see 13412 on the bottom left-hand corner? Do you see that, Dr Cheng?

A. Correct. Yes, I see.

Q. Yes, and that corresponds, if we look at the expert bundle, page 375, paragraph 4.7 -- that is the port side red-light light bulb; correct?

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A. Correct.
Q. 13413, one row down, represents the green-light light bulb, starboard, and that is the other sheet --
A. Other sheet.
Q. -- that you had shown us, 13413. Correct?
A. Correct.
Q. So we now have port and starboard.
If we look at 13412, on the bottom right-hand corner, we can see white particles --
A. The bottom left.
Q. -- all around the damaged filament. Correct?
A. Correct.
Q. In fact the right-hand photo is a close-up of a particular part of the left-hand photo; is that correct?
A. The left-hand one is the close-up of the right-hand, or the upper one.
Q. Of the upper -- sorry? Sorry, the right-hand one is a close-up of the right part of the left-hand photo?
A. Uh, yes.
Q. Because you see the arrow there?
A. Yes.
Q. Also there is a microscopic view of --
A. The filament, the broken filament.
Q. The filament, yes.

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A. And it is obvious, some white powder deposit on it.
Q. Yes. The top part of this photograph, we don't see any white particles?
A. Yes, this is the -- let me see. The other end of the filament.
Q. The other end of the filament?
A. Yes, because the filament was broken and most of the filament was missing. The top one is the filament on one end; the bottom one is the filament on the other end.
Q. But the top one does not have the white particles?
A. Yes.
Q. Can we look at 13413, that being the green light, starboard. This one, we see black smoke particles. Can you point at any white particles?
A. The white powder in this photograph was not denoted, but you can see below the filament -- yes, here, the cursor indicates it's the white powder.
Q. Yes.
A. And maybe you will ask the question why not much white powder was found on the filament.
Q. Yes.
A. It's that it is a very complicated reaction. Depends on temperature, how fast the oxygen comes in. So in each -- this case, the amount of oxide will be varied.

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Q. Right.
A. But the most important is that the glass bulb was broken, cracked, and also we observe some white oxide. And also, the colour of filament. And I have a control filament -- I don't know whether the Chairman wants to see it. In original form, you can see the filament was shiny when it is not damaged.
THE CHAIRMAN: Yes, perhaps that would help us.
MR SHIEH: That's 13416.
A. Yes.
THE CHAIRMAN: May we see that.
A. Yes. You will see from the picture the original form of the filament. It appears shiny. (Handed).
THE CHAIRMAN: Yes, we'll scan that as well. Thank you.
MR SHIEH: What were the conditions of the control, actually? It was switched on or switched off?
A. The control is provided from police. I don't where they take it from. But should not be related to Lamma IV. Just of the same model to illustrate the original form.
Q. Yes, I know. But you have to describe the conditions under which --
A. The condition, it is intact, without broken.
Q. Not broken, intact?
A. Yes, intact. But even if the glass bulb was broken, the tungsten at room temperature will not oxidise, will

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appear at the same even now the glass bulb was not broken.
THE CHAIRMAN: At what temperature does it oxidise?
A. Should be at a very high temperature. For this kind of filament, the temperature normally reaches about 3,000 degrees.
MR SHIEH: Celsius?
A. Yes, Celsius. So for some cases, for the traffic accident cases, because the headlight will crush, and if the glass -- the glass, when hit on the filament, will melt and deposit on it. So that's why we understand the temperature was very high, then the reaction will taken place at this temperature.
THE CHAIRMAN: Thank you.
MR SHIEH: So the control experiment, the condition is that it is switched on but the glass was intact?
A. Yes.
Q. And examination would show that the physical appearance of the filament would be shiny?
A. The control was just used for comparison.
Q. Yes, I know.
A. I did not do any testing on it.
Q. I know, I know. But in terms of appearance, the control -- the difference in appearance between the control --

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A. And the -- yes.
Q. -- and the damaged bulbs was that the control, the filament appeared to be shiny?
A. Yes, shiny, and different from the one collected from Lamma IV.
Q. Returning to paragraph 5.2. We were talking about the embedding of the missing part of the port hull of Sea Smooth in the gash of Lamma IV. I think in paragraph 5.2, I stopped reading at "continuous scratches on the hull of Lamma IV". Then you said:
"When the broken keel of Sea Smooth reached the position of the bulkhead between the engine and tank rooms of Lamma IV, the gash on Lamma IV ended and replaced by deep scratches on the hull surface, probably due to the hull having been reinforced by the bulkhead."
Could I ask you to look at your album, page 387.
Could we have a close-up.
Let me finish with this point about the hull of Lamma IV before we go back to your control.
Now, we are at a point in time when the broken keel reached the position of the bulkhead between the engine and tank rooms. So if we were to zoom in on this photograph, we are at the point in time where the port hull would have reached the position of that rope dangling from that -- yes. This point in time, where

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the gash ended; correct?
A. Correct.
Q. When you said "replaced by deep scratches on the hull surface", the deep scratches would be the scratches in that narrow strip between the two holes, right?
A. Yes, the position of the cursor indicates that.
Q. That is because a hole could not be formed because there was a bulkhead over there; correct?
A. Correct.
Q. You went on:
"Without reinforcement of the bulkhead, the hull of Lamma IV at the tank room yielded again and the broken keel of Sea Smooth ripped it open and left a hole there."
A. Yes.
Q. Basically that was the other hole on the right-hand side that we saw at page 387. So that's the other hole.
"At that moment, the foredeck of Sea Smooth had probably reached the air-conditioning unit at the rear of the main deck cabin of Lamma IV, while the port side of the weather deck of Lamma IV had come into contact with the front panel of the main deck cabin of Sea Smooth. Therefore, the impact between the main deck cabins stopped Sea Smooth moving forwards after ripping the hole in the tank room of Lamma IV, probably

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resulting in the disengagement of the two vessels."
In your opinion, what would have stopped Sea Smooth continuing to move forward? Because we know that the maximum point of penetration was near the centre of the ship.
A. Yes.
Q. But in your opinion, why did it not continue to move forward?
A. If Sea Smooth continued to move forward, I would suppose the wall of the main deck cabin and also the air-conditioning units will crush down. Since the fact is that they are intact, so when Sea Smooth reached that position, it cannot go further.
On the other hand, when we see the foredeck of Sea Smooth -- in page 384, that is the front panel of the main deck cabin of Sea Smooth.
Q. Yes.
A. The blue smear on the front panel of the main deck is an indication that the edge of the weather deck reached this position. Because the front panel of this main deck cabin was strong, and also the vessel cannot further penetrate into the Lamma IV, so these two positions, the main deck -- the front panel of the main deck cabin and also the air-conditioning unit in the Lamma IV, these two, my opinion is that will stop Sea

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Smooth continuing its forward moment. And the collision between these two areas may contribute some force, resulting in the disengagement of the two vessels.
Q. When you refer to the disengagement of the two vessels, are you describing a scenario whereby the two vessels disengaged simply as a result of the force exerted at the point of collision and not because of, let's say, a deliberate movement or manoeuvring on the part of either of the vessels?
A. Probably, but my opinion is that it is more likely the collision caused the two vessels to separate. But, sure, I cannot totally exclude that the Sea Smooth has deliberately reversed.
Q. Because you refer to this concept of disengagement, and that is why I would wish to perhaps follow up.
You say you cannot exclude the possibility of Sea Smooth having reversed out?
A. Yes, because I cannot find any physical evidence to support this one.
Q. Right.
A. But just from the overall damage, my opinion is more likely that they disengaged due to the collision.
Q. Right. When you say "disengaged due to the collision" -- separated?
A. Separate from each other.

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Q. Right. Stripped of scientific language, basically the two vessels collided and obviously each would have been travelling at a particular speed.
A. Correct.
Q. And obviously, when two moving objects collide, the rules of physics would actually dictate their movement thereafter, even if no extra force or extra manoeuvring were applied, if they simply continue in their natural course.
A. Yes, because since the bow of the port hull of Sea Smooth -- if that part was not torn apart, I think the port bow will hold the Sea Smooth firmly. But because the planking of the port bow of Sea Smooth has torn apart, left in Lamma IV, so the two vessels, my opinion is that there is not anything physically to make the damage -- maybe I will use the term Dr Armstrong used -- "join". Because there are no strong forces holding the two vessels together.
So once Sea Smooth continued to move forward, when it hit on the rear -- correct, it's the law of physics -- when the two objects collide together, the force will maybe push -- for example, my left hand is Lamma IV; this is Sea Smooth. When it hits on the rear, it will apply force, push it here. And maybe -- it defends on how much force is remaining.

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If at the moment of the contact, the force is very small, then maybe it will just loosen apart a little bit. But if the force is strong, then it will push this backwards. But because I cannot ascertain the speed at the time of contact, the bow hit the central air-conditioning unit and also the weather deck hit the front panel of Sea Smooth, so I cannot ascertain accurately whether at the end of the collision or the contact, I cannot ascertain whether they will completely separate totally. But my opinion is that more likely Sea Smooth will push Lamma IV to that way and may separate on its own. This is --
THE CHAIRMAN: For the record, when you say it's more likely that Sea Smooth would push Lamma IV "that way", that's in the same direction that the stern of Sea Smooth was moving; is that right? In other words, the stern of Lamma IV would move towards its starboard?
A. Yes, to the starboard. Yes.
THE CHAIRMAN: Have I got that accurately?
A. Can you repeat?
THE CHAIRMAN: Yes. I'm just trying to put down what "that way" means, because when someone reads the transcript, they won't understand that.
You've got Sea Smooth coming into contact with the port quarter of Lamma IV.

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A. Correct.
THE CHAIRMAN: The gesture you made with your hand was that Lamma IV would then move its stern towards its starboard, which is consistent with the direction, broadly, that Sea Smooth was moving.
A. Yes.
MR SHIEH: I think you also mentioned a point, that because of the breaking of the port hull --
A. Correct.
Q. -- we know the missing stem bar --
A. Yes.
Q. -- the entire part that was missing --
A. Yes, and wedged in the gash.
Q. If I could use a kind of layman-like, figurative term, it is not like a dagger having been stuck into somebody's body and somehow it remained there?
A. Yes.
Q. It's a case where actually the top of the dagger, the tip of the dagger actually broke off and the tip of the dagger that broke off is that bit which remained in the gash?
A. Yes.
THE CHAIRMAN: Just dealing with the stem bar and keelson of the port hull of Sea Smooth. Do we have information that tracks down the maintenance record? We were

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provided with some material that doesn't seem to answer that.
MR SHIEH: That was a question that was asked yesterday, the metal plate that would show that it was actually taken for maintenance.
THE CHAIRMAN: Yes. Perhaps we can come back to that later.
MR SHIEH: It's being followed up. There was a reminder this morning and also I think there's a reminder now.
Dr Cheng, can we now come back to the control experiment. The examination worksheet that we now see on the screen. We can see that it concerns a filament bulb which has not been broken. So this represents what you get at the end of the day, after having switched on the light bulb; right? The light bulb has been switched on.
A. Yes, this can be switched on, but it's not related to Lamma IV.
THE CHAIRMAN: No, but it's not switched on in the photograph, is it?
A. I just do it in the laboratory, make sure that this one can work properly.
THE CHAIRMAN: Yes.
A. Then I take a record, just for comparison.
MR SHIEH: Yes. So this is basically what a normal, unbroken filament, tungsten filament would look like?

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A. Correct. Exactly.
Q. And in the normal course of things, if you had switched on a filament bulb and switched it off and simply observed it -- perhaps I'll scrap that, because if you have just switched off a filament, there should still be some light glowing.
A. Sorry, can you --
Q. Not a very good question. Anyway ...
Indeed, the purpose of the control is simply to compare the appearance?
A. Correct, yes.
Q. I'll now move on in your expert report to paragraph 5.3:
"The gash and the hole were respectively in the engine room and tank room ... of Lamma IV. The lower half of the gash and the hole were below the waterline and they were large, so flooding of the engine room and tank room, including compartment F ..."
Compartment F was the steering gear compartment; correct?
A. Correct.
Q. "... which was separated from the tank room by a non-watertight bulkhead, could have been immediately and unstoppable. Flooding of the three aft compartments out of a total of six would finally cause the bow of Lamma IV to tilt up and the stern immersed in water

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vertically."
Correct?
A. Correct.
Q. "The rectangular imprints on the deck of the upper deck cabin of Lamma IV and the presence of detached seats strongly indicate that the seats had been originally affixed to the deck but they were detached from their mounts recently. Recovery of numerous 2.7 cm long screws and the examination of the remaining seat in the upper deck cabin indicate that the 2.7 cm long screws were used to secure the seats on the fibreboard deck, which was made up of 3 mm fibreboard on top of 3 cm thick foam."
Can you look at some photographs which Dr Armstrong produced. It's page 467 of the same bundle. If you look at the sketch at the bottom of that page, does that fairly represent the sort of scenario that you are describing at the bottom, at the end of your paragraph 5.4?
A. Yes, agree.
Q. Thank you. Back to your report, paragraph 5.5:
"The findings in paragraphs 3.6.2-3.6.5, particularly more than two screw holes in one mounting position, indicate that the fibreboard deck of the upper deck of Lamma IV was not strong enough to maintain the

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shape of the mounting holes to grip the screws tightly. The mounting holes could have been enlarged/deformed over time such that the grip of the screws would be reduced, and the screws would be loosened. Therefore, the loosened screws had to be remounted to the fibreboard deck at new positions, resulting in more than a pair of holes in some of the mounting positions of the seats in the upper deck cabin."
Here we are talking about the phenomenon at page 394 of the bundle that we saw, with two pairs of parallel holes; correct?
A. Yes, exactly.
Q. You would reckon that the need to actually drill another pair of holes was because the original pair had somehow worn out or were no longer strong enough to hold the grip of the screws, and that's why they had to pull it out and create a new pair of holes?
A. Exactly.
Q. Thank you. Paragraph 5.6:
"The force ... required to detach seats with four mounting plates, affixed ... was found to be less than 230 kilograms force when pulling at the bottom frame. If the force was evenly exerted on the seats, viz, a person sitting or hanging on it while the vessel was vertical, the force needed to detach the seat might be

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reduced by half to less than 115 kilograms."
That was the part that we actually looked at earlier. This was the point about the further away you are, the less force you would need.
A. Correct.
Q. Thank you. Paragraph 5.7:
"When the bow of Lamma IV started tilting up, the fallen false ceiling panels, the detached seats and victims not having grabbed some fixtures would roll to the rear end of the upper deck cabin, probably blocking the door to the weather deck, which was the only exit as indicated by the exit signs. At that juncture, the only available exit should be the opening of the sliding windows on either side, of which only the first one on the starboard side was open.
The seats in the main deck cabin of Lamma IV were secured to the metal deck of 2.7 cm long bolts, and they remained in their places after the tragedy, indicating that the metal deck was strong enough to hold the bolts as well as the seats."
Dr Cheng, you confirm all that?
A. Yes.
Q. Paragraph 5.9:
"The bulbs of the two sidelights and the masthead light of Lamma IV all could have been on before their

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glass bulbs were cracked, probably due to rapid cooling of the hot glass bulbs by water ingress."
A. Agreed.
Q. "No stowage of life jackets was found on the weather deck of Lamma IV. Passengers on the weather deck had to return to either cabin to get life jackets or use the lifebuoys on the weather deck."
Correct?
A. Correct.
Q. "After the collision, the port hull of Sea Smooth had totally lost its first watertight compartment below the foredeck, causing flooding of the second compartment as well. Therefore, the non-watertight manholes in the main deck cabin to these two compartments were exposed, and were about 1.5 metres above the water. Therefore, water splashing onto them, probably by either the movement of the vessel or waves, could have leaked into the main deck cabin."
Could I ask you to look at the manholes. You're talking about the same sort of manholes that we see in the album at page 385, correct? You took some photos of the manholes?
A. The manhole will be much more clear at page 383, photo 4.
Q. Yes.

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A. You can see the bottom of the manhole in the first compartment.
Q. Yes. Page 383. This is the picture of the manhole taken from inside the compartment, going up?
A. I was in -- yes, okay, inside the compartment.
THE CHAIRMAN: Why do you assert that this is a non-watertight manhole?
A. Because I have checked the manhole. I did not find any rubber sealing. If this is watertight, I might expect some rubber sealing on the edge, and the fitting just good enough to cover the hole rather than completely seal the compartment from the main deck. So my opinion is that this is a non-watertight manhole.
THE CHAIRMAN: But did it have a mechanism where it could be screwed down by using the lever mechanism?
A. I see there is a wrench, just lock the manhole in the position, because I asked a crew member to show me how to open the manhole and when I'm doing this, I find he just turn a switch about -- I don't exactly know how many degrees. When he turn the key, then the manhole did not press down; just remain on the same level. So if he turned the key, if press down, then I suppose I will see this while the crew member did this. But I did not find that. So I just guessed this manhole should be non-watertight.

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THE CHAIRMAN: So it wasn't a case of rotating the wrench through 360 degrees a few times to screw it down, it was --
A. I see the mechanism is there's a bar at the bottom. When it's switched from one position to the other position, then it engage with the bottom, then the manhole cannot be taken out.
THE CHAIRMAN: Yes.
A. So this is how the manhole operates. Very simple.
THE CHAIRMAN: Thank you.
MR SHIEH: You mentioned the absence of rubber sealing, a rubber seal.
A. Yes. If this thing designed for watertight, I would suppose there's some sealing. Rubber sealing is commonly used for stop the water coming from one compartment to another compartment, or from one place to another place, even in a laboratory instrument. It is quite common.
Q. Because if we look at the appearance of the manhole from inside the cabin at page 385, we can see one manhole has been opened and the other one is closed. You can see?
A. Yes.
Q. Are you saying that if the manhole does not have a rubber seal, the fact that you could actually affix a lid which could only be opened with a cross-wrench

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doesn't mean that it's necessarily watertight? You need the rubber sealing to make it watertight; is that what you're trying to say?
A. Yes.
Q. So even if all the manholes were "closed" by having a lid on, without the rubber seal, it would simply not be watertight, and with a gigantic water influx to one or more of the compartments, water would still leak into the cabin?
A. It has this possibility.
MR SHIEH: I see that it's 1 o'clock. I will continue perhaps after lunch.
THE CHAIRMAN: Yes.
Dr Cheng, we're going to take our lunch break now. If you're able to locate those photographs that you were going to try and find --
A. Yes, I will try.
THE CHAIRMAN: -- please do so.
A. Okay.
THE CHAIRMAN: But in any event, please be back here at 2.30 to resume your evidence. Thank you.
(1.00 pm)
(The luncheon adjournment)
(2.30 pm)
THE CHAIRMAN: Yes, Mr Grossman?

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MR GROSSMAN: Mr Chairman, before we begin, I've just been discussing a matter with my learned friends, and that's the position of Mr Tang.
THE CHAIRMAN: Yes.
MR GROSSMAN: He has been sitting here all week.
THE CHAIRMAN: All week?
MR GROSSMAN: Since Tuesday, because we never really knew when he was going to be called. It seems unlikely that he'll be called today, and I understand Dr Armstrong on Monday. He will be working at Hongkong Electric, which is in Kennedy Road. My learned friends have no objection to this: I wonder if he could be released on one hour's notice?
THE CHAIRMAN: Of course. This is a matter for counsel to resolve, but our apologies to him if he's been waiting since Tuesday.
MR GROSSMAN: Not at all. It is understood -- every day there was a possibility he would be called.
THE CHAIRMAN: Thank you for raising it.
Mr Shieh?
MR SHIEH: We shall work out a plan so that Mr Tang can attend this hearing reasonably swiftly upon us getting to a convenient slot.
THE CHAIRMAN: Certainly.
MR SHIEH: Dr Cheng, I understand that over the lunch

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adjournment you have managed to locate some photographs.
A. Yes, two photographs taken by me.
Q. Two photographs.
I hope that they have been scanned.
THE CHAIRMAN: They have, or at least a copy has reached me.
MR SHIEH: We all have hard copies, and a scanned copy is now on the screen.
Dr Cheng, on the top of this series of photographs -- can you describe to us the location at which you took this photograph?
A. This is the wall on the port side, near the door, near the sliding door.
Q. Of which cabin?
A. The main deck cabin.
Q. Main deck? The lower one?
A. The lower one, yes. The middle one or --
Q. Yes, the middle one.
A. The main deck cabin.
Q. Yes. The purpose is, I suppose, among other things, to show the deck plan which was affixed to the wall?
A. Yes.
Q. How about the bottom photo?
A. The bottom photo shows another mounting plate which is used to affix the legs of the seats using rivets.
Q. This one shows affixing with rivets?

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A. Yes. And the position of this photograph is on the upper deck cabin, on the port side, near the rear.
Q. So we are talking about the rectangular shape where the cursor is now pointing?
A. Yes.
Q. Pointing to the rectangle -- yes.
Can the cursor point -- yes.
This is the rectangular mounting plate?
A. Yes.
Q. And there should be two holes in the middle?
A. From this photograph, we can see one on the left, but on the right, maybe it was covered by the dirt.
Q. Yes. The one on the left is reasonably clear, because it is against a light-coloured background.
A. Yes.
Q. That's correct?
A. Correct.
Q. One might just be able to make out the one on the right, because you can see a part with a particularly darker shade, a circle.
A. Yes.
Q. The one where the cursor is pointing now?
A. Correct.
Q. Those two would be where you can find the rivets; that's right?

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A. Sorry?
Q. That is right, right? The darker circle where the cursor is now pointing, that would be where the other rivet would be found?
A. Maybe, but I did not make a detailed examination of this because I found it out at the later stage when I prepared my statement.
Q. Okay. Thank you.
A. So this is just a record showing that probably another mounting plate used for affixing the leg of the chair using rivet.
Q. Thank you. Now, concerning the deck plan --
THE CHAIRMAN: Just pausing there, Mr Shieh.
Amongst the material we have, do we have any maintenance records from Cheoy Lee as to work done on this vessel, what kind of work was done, as far as this aspect is concerned?
MR SHIEH: Mounting of chairs?
THE CHAIRMAN: Yes, repairing of chairs.
MR SHIEH: We'll follow that up. Not to my immediate recollection, matters such as fixing or refixing of chairs. Perhaps Mr Pao can help.
THE CHAIRMAN: Mr Pao?
MR PAO: Mr Chairman, my instruction is the chair maintenance was not done by Cheoy Lee.

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THE CHAIRMAN: Then by deduction, it looks as though that's a matter that we'd ask you to look at, Mr Grossman.
MR GROSSMAN: I certainly will, Mr Chairman.
THE CHAIRMAN: Yes.
MR SHIEH: Concerning the question of the deck plan, obviously the top photograph shows the deck plan on the wall, but there is no particular photograph where your focus is to take a picture of the deck plan itself, right? Because I suppose if you had, you would have produced it.
A. Sorry, what do you mean?
Q. The photograph here, the focus is not really on the details of the deck plan. You took a picture and it happened that the deck plan is on the wall. I was asking whether you have taken a photo --
A. Close-up?
Q. Close-up.
A. No, no.
Q. No.
A. But this photograph, I just -- I want to illustrate the position. So that's why it is not in the middle, and on the left-hand side we can see the collapsed panel, such that I can clearly know what is the exact position of this deck plan.
MR SHIEH: Mr Chairman, despite all the efforts, we were

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unable to find a deck plan, whether similar to that one, or at all in the bundles.
MR PAO: Mr Chairman, in fact it's marine bundle 2 at page 264.
MR SHIEH: Page 264. That's called "Safety plan".
THE CHAIRMAN: Does the legend help us as to the circumstances in which the photograph was taken? Is there a legend in this marine bundle 2, page 264, that tells us where and when the photograph was taken?
MR SHIEH: Mr Chairman, page 264 is a drawing, not a photograph. The covering letter is from Cheoy Lee, November 1995.
THE CHAIRMAN: Yes, I see. So not something displayed on the vessel?
MR SHIEH: No. But from visual comparison, it looks like the sort of thing that one found on the vessel. But again, from visual appearance, it bears the appearance of let's say the General Arrangement. Because if one were to look at the General Arrangement, in terms of the layout of the ship, it bears a resemblance, although the underdeck plan contains probably more details.
MR PAO: Perhaps I can be of some assistance. My instructions are that this is the plan that was finally approved by the Marine Department as to the seating, after they measured everything.

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THE CHAIRMAN: Yes.
MR PAO: When you see the crosses marked at the rear of the main deck, those are where the life jackets are supposed to go underneath the passenger seats.
THE CHAIRMAN: Yes.
MR PAO: Then this is the plan that was approved finally.
THE CHAIRMAN: Very well. Thank you.
The one that's in the photograph that Dr Cheng has kindly found for us, the question going through my mind is, is that something that was on board prior to the sinking of the vessel, or have those who have been trying to sort out where things are in the vessel affixed to the wall during the salvage operation?
Can you help us, Dr Cheng? Do you remember? Did this look as though it had been under the water, or is it something that had been brought in by divers and policemen, perhaps, so that they could find their way around the vessel?
A. I took this photograph -- let me think -- on the first day of my examination. It's on 3 October. At that time, Lamma IV was beached at Nga Kau Wan. At that time, it was affixed on the wall.
THE CHAIRMAN: Thank you.
MR SHIEH: Maybe Hongkong Electric may be able to answer whether they have, in the course of --

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THE CHAIRMAN: Now we've zoomed in it does seem to be securely affixed.
MR GROSSMAN: I'm just checking that.
THE CHAIRMAN: Thank you.
There is a photograph in --
A. And also, Mr Chairman, I remember at that time that piece of paper was still wet, because it's sandwiched underneath a plastic cover, and the water cannot easily go away. So it was wet and I advised the police to make a copy to me for my examination.
THE CHAIRMAN: Thank you.
Police album III photograph 20, seems to depict the same scene from a slightly farther distance.
MR SHIEH: Yes, and one would be able to see a distant image of the same plastic board and the plan underneath.
THE CHAIRMAN: Could somebody give us the reference for album III, photo --
MR SHIEH: Police album III, page 145. If we were to zoom into the right-hand side, far right. Underneath the orange life jacket, there seems to be that plan which was hanging.
THE CHAIRMAN: Thank you.
MR SHIEH: Dr Cheng, I'd like to come back to your written report. Before the lunch adjournment, we were talking about the manhole. Paragraph 5.11.

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We move on to paragraph 5.12:
"The watertight bulkhead of the third compartment ... of the port hull of Sea Smooth could have successfully prevented substantial water ingress from the damaged compartments."
That is the bulkhead separating compartments 2 and 3; correct?
A. Correct.
Q. Because compartments 1 and 2 were flooded, so the bulkhead between compartments 1 and 2 was broken, damaged?
A. Yes.
Q. "The bilge water in compartments 3 and 4 of the port hull was minimal, and should not threaten to sink the vessel.
After the collision, crew of Sea Smooth could access and check the damage to the underdeck, the compartments, via the manholes in the main deck cabin, using either cross-wrench, respectively kept near the stern and a storage space under the stairs in the middle of the main-deck deck. It would take a crew member about 5 minutes to check all the first 10 compartments for any damage or leakage.
The draft measurements showed that after Sea Smooth lost the first two watertight compartments of the port

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hull, its buoyancy was only slightly affected and the vessel was slanted about 2.4 degrees to the port hull whether it was loaded with 104 persons or not."
That actually brings us back to paragraph 2.11.2 of your report, page 366. When you refer to "only slightly affected and the vessel was slanted about 2.4 degrees to the port hull whether it was loaded with 104 or not", you are talking about that table gradient along the width, are you?
A. Yes.
Q. We move back to paragraph 5.14:
"In addition, the draft of Sea Smooth almost did not change after the weight of 104 persons was loaded onto the empty Sea Smooth."
By that, I take it that you are again referring to that table at page 366?
A. Correct.
Q. When you say "the draft almost did not change", you are talking about the draft on the starboard bow, port stern and starboard stern?
A. Yes.
Q. All three drafts?
A. For the bow, just change of about 20 centimetres.
Q. Right. Thank you. Then, "Conclusion":
"The bow of the port hull of Sea Smooth had hit the

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port quarter of Lamma IV at an angle of approximately 30 degrees ..."
This obviously you have to read subject to your comment about your only measuring the physical dimension.
A. Correct.
Q. "... ripping a gash of 0.3 metres wide by 4.4 metres long in the engine room of Lamma IV. After collision, the bow of the port hull of Sea Smooth had wedged in the gash on Lamma IV. When Sea Smooth continued to slide along the port hull of Lamma IV aft, the fibreboard planking of the bow of Sea Smooth that was wedged in the gash was torn apart from the hull, leaving behind in the gash, and the broken keel of the port hull of Sea Smooth pierced a hole of about 0.5 metres in the tank room of Lamma IV before the two vessels totally disengaged from each other. As a result of the collision, Sea Smooth had lost the first compartment of the port hull."
So far you would confirm all this?
A. Confirmed.
Q. "During the collision, the foredeck of Sea Smooth had breached the side panel of the main deck cabin of Lamma IV on the port side and jammed into the cabin, crushing the seats on the port quarter and causing collapse of the false ceiling frame. At that juncture,

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the side panel on the port bow of Sea Smooth was torn and detached."
Again, we are talking about -- no, "it was torn and detached".
"As the tank room and the last compartment of Lamma IV were separated by a non-watertight bulkhead, the bottom part of the gash and the hole on Lamma IV below the waterline caused rapid flooding of its three aft compartments. When the stern of Lamma IV lost its buoyancy, its stern started sinking with its bow tilting up nearly vertically.
In the upper deck cabin of Lamma IV, rows of seats were originally secured to the fibreboard deck by screws. However, when the bow of Lamma IV was tilting up, it would have taken the weight of only two or three adult passengers, who might have been sitting on, standing on and/or holding the row of seats to get balance, to cause the seats to be broken off from its mounts on the fibreboard deck as the fibreboard was not strong enough to grip the mounting screws and yielded under such pulling force. The upper deck cabin had only an exit at the rear. Passengers losing balance and the detached seats rolling to the rear end of the upper deck cabin when Lamma IV sank vertically could have blocked the only exit, rendering escape from the cabin

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difficult.
The sidelights and masthead light of Lamma IV were highly likely to have been lit before their housing was flooded and the glass bulbs were cracked by seawater."
Could I pause here, just to get the matter crystal-clear, at least in my mind. The cracking occurred because the interior of the bulb was very hot, so when seawater, which is cold, same into contact with the outer surface of the bulb, the differential in temperature resulted in that cracking of the glass?
A. Will cause to break, correct.
Q. Because of the cracking of the glass, air went into the bulb and the oxygen in the air --
A. Reacted with the filament.
Q. -- reacted with the very hot tungsten?
A. Correct.
Q. Thank you. That's the sequence?
A. Yes.
Q. Thank you. Paragraph 6.6:
"The damage to Sea Smooth was mainly confined to the port hull at the first two watertight compartments, which had been flooded. However, the watertight bulkheads of the intact compartments had prevented further flooding of the port hull. To assess the damage to the compartments of the vessel, crew members of Sea

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Smooth could have done so through the ten manholes in the main deck cabin.
After Sea Smooth lost its first two compartments of the port hull, the vessel was tilting slightly downwards to the port side and the front, probably by about 2.4 and 0.5 degrees respectively."
Again, 0.5 degrees is a reference back to the table that we can find earlier on in your report at page 366, under the row "Gradient along the length: 0.5 degrees"; correct?
A. Here I think I need to make an amendment.
Q. Right.
A. The vessel should be tilting slightly downward to the front by about -- sorry, to the port side by about 2.5 degrees.
Q. 2.5?
A. 2.5, yes, instead of 2.4.
Q. Because that was with persons, not with --
A. Yes, yes. Correct.
This is the amendment I want to make.
THE CHAIRMAN: Thank you.
MR SHIEH: Thank you.
Paragraph 6.7 now reads "about 2.5 degrees and 0.5 degrees respectively"?
A. Yes, confirmed.

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Q. Thank you. Is there anything else that you wish to amend or correct in this report of yours?
A. No.
MR SHIEH: Thank you, Mr Chairman.
Could you remain in the witness box, because some other counsel may have questions for now.
A. Okay.
THE CHAIRMAN: Mr Grossman?
MR GROSSMAN: Mr Chairman, I'd like to ask questions, and let me say immediately very few, but on four areas. The first is on the wheelhouses of the Lamma IV and the Sea Smooth. The second is on the damage to the seats. The third is on the question of the life jackets. And fourthly, the damage to the Sea Smooth.
THE CHAIRMAN: Yes, please do.
MR GROSSMAN: Thank you very much.
Examination by MR GROSSMAN
MR GROSSMAN: Dr Cheng, I represent Hongkong Electric. I just have a few clarification questions to ask you.
A. Okay.
Q. First of all, I want to ask you about the wheelhouse of Lamma IV. I see you mention briefly the wheelhouse in your paragraph 3.5.1.
A. Yes.
Q. So I take it you visited the wheelhouse?

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A. Sorry?
Q. I take it you went to the wheelhouse, did you?
A. Yes.
Q. Did you take any notes of the dials and their positions?
A. No, I didn't.
Q. Any notes of the position of the levers?
A. No.
Q. Any notes of the position of any of the switches?
A. No.
Q. And the rudder indicator?
A. No.
Q. No. Is there any particular reason why you didn't do that?
A. Because this is not my expertise, and I do not know -- I would not comment on these matters, so I did not make notes on that.
Q. Very well. Did you go to the wheelhouse of the Sea Smooth?
A. Yes, I did.
Q. I wonder if you could help us on this matter, please. Would you have a look at police photo album I at page 30. Do you have it?
A. Yes.
Q. There's an item there.
If we look to the left of the -- let me call this

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the wheel. Further left. Just the other side of what looks like -- just carry on to the left, please. More. Just up a bit.

What is that item? Do you know what it is?

A. I don't know.

Q. All right. There's a better view of it, I think, at page 115. Do you see it?

A. Yes, I see.

Q. What does it look like to you?

A. Just comment based on the photograph, you mean?

Q. Yes.

A. Something used for cooking. Looks like a pot.

Q. It's a rice cooker, is it?

A. Maybe.

Q. That's what it looks like, anyway.

A. Yes, it looks like it.

THE CHAIRMAN: Do we know when this photograph was taken?

MR GROSSMAN: Yes, we do. If you just give me a moment. The one at page 30 was on 2 October. One can see that on page 2. That's a list of the photographs.

THE CHAIRMAN: Thank you. And this one?

MR GROSSMAN: It seems to be the same one, but enlarged.

I'm sorry, that was taken on the 3rd, I think it was. That was taken on 3 October. We see that on page 60.

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THE CHAIRMAN: Thank you.

MR GROSSMAN: Did you notice this rice cooker when you were there? Dr Cheng, did you notice the rice cooker when you went aboard the Sea Smooth?

A. Just give me one minute. Which photograph are you referring to?

THE CHAIRMAN: Perhaps we could put it up again. Page 115, isn't it?

MR GROSSMAN: Yes, that's the one. Thank you.

A. Oh, this one. Okay. I did go to the wheelhouse of Sea Smooth to make some records, but at that time I did not do any examination on what I will call this dashboard. So my opinion now is just a layman, just from this photograph.

THE CHAIRMAN: Yes.

A. This is not related to my expertise. It really looks like a rice cooker.

THE CHAIRMAN: Yes. The question is, did you notice it at the time you were in the wheelhouse?

A. No, no. Because I did not make -- I've said that I just want to check the overall layout of the wheelhouse. So what I am concerned is that -- is the window clear, what is the overall situation over there. So I just make a simple note, and I wasn't aware of the things on the dashboard.

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THE CHAIRMAN: Thank you.

MR GROSSMAN: Yes, thank you.

I want to ask you now a few questions about the seats. You've told us about the experiments that you did --

A. Yes.

Q. -- about the weight that would be needed to dislodge the seats.

When you were doing your calculations, did you take into account the impact of the Sea Smooth on Lamma IV? Perhaps I can explain it like this. You've got a vessel travelling at, say, 20 knots. It weighs, say, 200 tonnes. When it hits, and it hit very hard, the Lamma IV, the energy -- and excuse me for not using pure scientific terms -- would be pushed forward, wouldn't it?

A. Yes, agree.

Q. Do you take that into account in assessing how quickly the seats may have been dislodged?

THE CHAIRMAN: I don't think he gave an estimate of time; he gave an estimate of force required.

MR GROSSMAN: Of force, yes.

Let me put it this way. I understand, of course, there was no comment on the exercises that you did, but isn't it rather artificial, with respect, when you bear

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in mind the fact that the Lamma IV was struck at, say, 20 knots by a 200-tonne vessel?

A. First of all, my experiment was conducted just to illustrate how much force was needed to detach a seat. It is not related to the situation during a collision.

So just -- if your question is asking me whether, when these two vessels collided and have the force, let's say the passenger leaned backwards, to cause the detachment of their seat, my opinion is that when somebody properly sits on the seat, on the chair, just like the chair here, the chair now I'm sitting on, when I attempt to lean backwards (demonstrates), we won't expect we will topple. I apply a force backwards, right? But why? It's because when we sit on the chair, there are two forces. First, the force is my body weight. My body weight will press the chair firmly towards the ground. When I lean backwards, part of my body weight will transfer to the back of the seat. So whether the seat will topple depends on which force is larger. In normal situation, when I properly sit on the seat and I lean backward, this force will not be large enough to topple me, even now the chair I am sitting on is not affixed to the floor, right.

So in our situation, I think if at the time of collision, the force generated may be offset by the body

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weight of the passenger who sat on the chair and pressed it firmly against the floor so the force -- even the passenger will jerk backwards, the force will not be strong enough to detach the seat.

This is my opinion.

Q. But the force of the impact itself, as a matter of commonsense more than anything else, would have an effect on the attachment of the sheets to the deck, would it not?

A. I think it will have some impact, some influence on the -- how do you say? -- generation of force. But whether the force strong enough. But I have said that this -- because when the person sits properly on the floor, their body weight is quite high. The force generated backwards should be larger than the body weight, otherwise it's quite difficult to detach the seat.

Q. Yes.

A. So it includes a lot of calculations, how fast the -- it depends on how fast Lamma IV at that time was travelling forward. Also the rate -- I need to use a technical term -- the deceleration rate, just like when we are seated on a race car, when we accelerate we will generate a force backward.

So it depends on how fast Lamma IV was travelling

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forward and then stopped due to the collision. So this is quite a lot of variables. But I think it depends on how -- in this case, I don't have any information to support how far is the deceleration. So it's quite difficult to calculate the force it will generate.

But just a rough estimation is that if the force generated is near 1G -- 1G is that where the downward force is -- G is the gravitational acceleration, that is the body weight generated when I sit on the chair. And when the force towards the back is 1G, then balance -- more than 1G, then it will create a force to the backward.

So it includes a lot of calculations, and I cannot exactly answer this question. But from my opinion, it's quite difficult to generate a force more than 1G.

Q. I think I understand. Thank you. I'm really not asking you to do the calculations; I'm just trying to see what the factors were in causing the seats to come loose. I think you agree with me that one of the factors would be the impact. And secondly, as we -- or you may not know, the vessel started to tilt very quickly and in fact in round about, say, 90 to 100 seconds, it was almost vertical. Those factors would have a huge impact, would they not?

THE CHAIRMAN: They're two different factors.

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Would the collision have a huge impact on the integrity of the attachment of the seats to the upper deck? That's the first question.

A. My opinion is that it won't -- I think the collision is quite difficult to cause the detachment of the seat.

THE CHAIRMAN: The second question, Mr Grossman?

MR GROSSMAN: The second question: as we know, the vessel started going vertical very quickly indeed, and presumably seats would start to fall back and people would start to fall back, this too would have an effect on the speed at which the seats behind became detached, would it not?

A. Yes, agree.

Q. And these things aren't quantifiable, really, are they?

A. What do you mean of how to quantify?

Q. Well, you can't say, for instance, a seat would take exactly 3 or 4 seconds to detach.

A. You mean the timing?

Q. Yes.

A. Yes, difficult to quantify. It's just the force which, let's say -- what I have written in my conclusion is when the force of about the body weight of two to three adults, then this force will be enough to detach a seat. It depends on how many legs that row of seats has.

If just a total of four legs, then from my

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calculation, from my experiment, it should indicate that about two adults will be sufficient to detach a seat. If that row of seats had about six legs, that means one more pair, then it needs the body weight of about three adults, then the -- if that force is achieved, then the seat will detach. But I cannot comment on what is the timing. But I think at least when it started tilting up, the force generated would not be high enough. I think it maybe happens at a later stage, let's say maybe, just a rough estimation, 60 degrees or 70 degrees, I mean upwards.

Q. But of course --

A. At that time, I think the force will be sufficient to detach the seat from the deck.

Q. Yes. But, of course, here we had also the unhappy situation of people obviously falling backwards and thus creating a lot of pressure on the seats; you're aware of that?

A. Yes.

Q. Thank you. I just want to ask you, in this regard, about one point you mentioned. This is page 28, for your reference.

You said that the rivets were not strong enough for this kind of purpose. What did you mean? What kind of purpose?

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THE CHAIRMAN: Page 28 of what?
MR GROSSMAN: Page 28 of today's hearing.
THE CHAIRMAN: The transcript?
A. Because from my understanding, for rivet, when used to affix something, it cannot be used to indicate -- to affix the chair on the deck, and because I know that for this kind of material, it will weaken over time, because just like the window, the Government will tell citizens, "You need to routinely check the window", because the window -- we understand that we use the rivet to fix the windowframe to the wall. So over time, when there's water coming in and also the rivets made of aluminium will start to weaken, then this kind of material will deteriorate over time and will easily damage when there is a great force.

But when we compare a rivet to a screw, screw made of steel, it can last much, much longer and will not corrode easily.

So that's why my opinion is that it is much proper to use a steel screw rather than rivet to affix the chair, because we suppose the chair will be firmly affixed to the chair. Unless you expect you need to change this rivet periodically, let's say maybe you change it maybe -- let's say five years, you change it once, it may be acceptable. But that's just my opinion.

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Q. Yes. What I'd understood you to mean, and please tell me if I'm wrong, is that the rivets weren't strong enough to withstand the pressures that happened in the accident.
A. I did not measure the force, but I know that this material will corrode over time. And the fact is that we found a rivet snapped on board, but I did not find any steel screw broken into two pieces. Although we find from the police bundle, I can see a photo that shows that there is a steel screw with the head deformed. That is, it's strong enough that even if it starts to yield, bend, it won't snap into two pieces.
Q. Let me ask you now about the life jackets.
A. Okay.
Q. You said you found them in garbage bags.
A. Yes.
Q. That's rubbish, isn't it? They weren't garbage bags; they were white plastic bags. It's simply nonsense to call them "garbage bags". Do you agree with me?
THE CHAIRMAN: I'm not sure what you put your garbage in, Mr Grossman, but that's what I put mine in.
MR GROSSMAN: They're not garbage bags, are they?
A. Maybe I used a term that's not appropriate, but they do really resemble the garbage bags I use at my home. That's why I use this term. I agree it may be better to

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use the term "white plastic bag", but it's more for people to visualise how strong is this plastic bag. It's really quite soft. That's why I will agree that it is quite easy to tear it apart. Even I did not even need to unknot the knot.
Q. So you're prepared now to make your statement perhaps a little more accurate and say it was a white plastic bag?
A. Okay, yes.
Q. You've told us that you couldn't see any life jackets on the upper deck of the Lamma IV?
THE CHAIRMAN: I think he was talking about the weather deck.
A. Weather deck. Should be weather deck.
MR GROSSMAN: I'm sorry, weather deck.

Do you see any on the Sea Smooth? Perhaps I can help you. Would you look at --
A. I did not make a detailed examination on Sea Smooth.
Q. Pardon?
A. I did not make a detailed examination of the life jackets on Sea Smooth --
Q. Very well.
A. -- so I have no record.
Q. Now, I want to ask you, finally, something about the damage to the Sea Smooth. Would you look, please, at

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police bundle N(I) at page 3616.

Could we zoom in, please. If we could just scroll down, please. Thank you.

You see on this plan here the letters "WT MH", which presumably means "watertight manhole"?
THE CHAIRMAN: Whereabouts?
MR GROSSMAN: One can see them near the centreline. Where there are circles between the seats.
THE CHAIRMAN: Which deck are we looking at?

That's off to the right.
MR GROSSMAN: This is the main deck.
THE CHAIRMAN: Thank you.
MR GROSSMAN: Well, there are 10. We don't have to count them.

Did you examine each of these? There are 12.
A. Yes, I have asked a crew member to open all these manholes for me to examine the underdeck compartment.
Q. Were they sealed?
A. I did not find any seal.
THE CHAIRMAN: By that you mean rubber seal?
A. Yes, the rubber seal. Because from my -- I used my scientific mind. For me, if it did need a very stringent sealing, make sure that even if we apply some pressure on the -- for example, we fill the underdeck compartment with water and even increase the pressure,

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the water won't come into the main deck if it has the rubber seal. So this is why my opinion that it is not watertight. But I agree that maybe this "WT" may be referring to a watertight manhole. But just I use a different level of standard.

MR GROSSMAN: All right. Anyway, I'm told that the rubber seal is on the inside, but --

MR SUSSEX: No, it's on the inside of the cover.

MR GROSSMAN: Yes, on the inside of the cover, but somebody else will deal with that.

What I want to ask you about is your paragraph 5.13, if you would have a look at that, please.

What you say here, in the last sentence, "It would take a crew member", by which I suppose you mean one --

A. Yes.

Q. -- "about 5 minutes to check all the first 10 compartments for any damage or leakage."

A. Yes.

Q. So doing very simple arithmetic, if there's more than one person doing it, it could have been finished in a couple of minutes?

A. Correct.

Q. All right. And in that couple of minutes it would have been perfectly obvious, would it not, to anybody looking, that the vessel with which it had collided was

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very rapidly becoming vertical.

THE CHAIRMAN: I don't think this witness is in any position to deal with the time with which Lamma IV sank.

MR GROSSMAN: I'm just telling him. I don't think there's any dispute about that. It's more or less 90 seconds.

THE CHAIRMAN: Perhaps you'd get to the point that you're seeking to establish.

MR GROSSMAN: The Lamma IV sank in roughly -- it's not exact -- 100 seconds. I'm sorry, it came vertical within about 100 seconds. From your point of view, and I ask you from a forensic point of view, was there any reason why the Sea Smooth could not stop and pick up passengers in the sea?

THE CHAIRMAN: Well, that's a very wide question. Any reason arising from the integrity of the Sea Smooth? Is that what you mean?

MR GROSSMAN: Thank you. That's a better way of putting it. Thank you, Mr Chairman.

A. Can you repeat your question?

Q. Yes. From your point of view -- make the following assumptions: the damage could have been assessed quickly, within a couple of minutes.

A. Yes.

Q. During that couple of minutes, during that period, the Sea Smooth is becoming vertical --

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A. Lamma IV?

THE CHAIRMAN: Lamma IV.

MR GROSSMAN: Sorry, Lamma IV is becoming vertical. Was there any reason connected, say, with the integrity of the Sea Smooth that would prevent it stopping?

A. I have no comment on this. This is not related to forensic science.

Q. Can you think of any forensic reason why it couldn't then stop?

A. If I answer you this, I answer you as a layman, not an expert.

THE CHAIRMAN: No. There's no need to do that.

MR GROSSMAN: We don't want you to --

THE CHAIRMAN: If this is outside of your expertise, feel free to say so.

A. It is outside of my expertise.

THE CHAIRMAN: Thank you.

MR GROSSMAN: No further questions. Thank you.

THE CHAIRMAN: Yes, Mr Sussex?

MR SUSSEX: Mr Chairman, with your permission I'd like to ask this witness about his examination of the bulbs in the navigation lights, and I'd also like to put to him a photograph taken over lunchtime of the inside of a manhole cover on the Sea Smooth. That's currently being photocopied.

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THE CHAIRMAN: Yes. Are there any photographs that illustrate the same thing that were taken closer to the time of the incident?

MR SUSSEX: Not that we've so far been able to turn up.

THE CHAIRMAN: Very well. Please proceed.

Examination by MR SUSSEX

MR SUSSEX: Dr Cheng, in your report, and I'd just like to take you to three passages in your report, at paragraph 4.9.1 you give the results of your examination of the glass bulbs which had come from the Lamma IV. So not the control light bulb, but the port light, the starboard light and the masthead light.

A. Yes.

Q. You've said:

"The glass bulbs and the filaments of the red light, the green light and the masthead light were all found broken. Numerous white/black powders were found deposited on the inner side of the glass bulbs and the contact wires. These findings, together with the scene observation that water was found inside their respective housings, indicate that the filaments of the light bulbs could have been illuminated when the glass bulbs were cracked probably due to water ingress into the housings of these navigation lights."

So do I take it that your conclusion there, that

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they "could have been illuminated", included your evaluation of what the powders were that you had observed?
A. In the conclusion?
Q. You say that they "could have been illuminated", and that is based on the fact that they were broken, that numerous white/black powders were found deposited on the inside of the glass bulbs and the contact wires, and then you also add that with your scene observation that the water was found in the housings of the various lights and you say they "could have been illuminated".
A. Yes, agree.
Q. Right. Then if we go to paragraph 5.9:
"The bulbs of the two sidelights and the masthead light of Lamma IV all could have been on before their glass bulbs were cracked ..."
Then you give an explanation for the cracking:
"... probably due to rapid cooling of the hot glass bulbs by water ingress."
A. Yes.
Q. So again you use the phrase "could have been on"?
A. Yes, agree.
Q. Then in your final conclusion at paragraph 6.5, you say:
"The sidelights and masthead light of Lamma IV were highly likely to have been lit before their housing was

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flooded and the glass bulbs were cracked by seawater."
You haven't shared with us the process of reasoning by which you have moved from a conclusion that these "could have been illuminated", to a conclusion that it was "highly likely" that they were lit.
A. Okay. First of all, the conclusion -- my results in paragraph 4.9 are just based on the laboratory examination result alone, without considering any other information. So I used the wording "could have".
And then go to the analysis. Also, I just considered only the laboratory result and also the finding of the water in the housing. But in the conclusion, because I consider everything together, including the scene examination, including what I proposed that Lamma IV started to sink vertically, then I will foresee the sidelight, the housing, will come into contact with water. So this strengthened where did the water come from? It will not come from, for example, raining, or water coming inside the housing. So when I take into consideration that, I decided it could have come into contact with the seawater, and also I observed water ingress in the housing. This further strengthened my laboratory findings, so I used a wording much stronger. Then I will change the wording from "could have" to "highly

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likely". This is the foundation why I changed the wording.
Q. It's right, isn't it, that the filament of most light bulbs is made of tungsten, because the melting point of tungsten is high enough to withstand the intense heat produced in an incandescent light bulb?
A. Sorry?
THE CHAIRMAN: The first question is are most filaments in incandescent light bulbs made of tungsten?
A. Yes.
MR SUSSEX: The reason for that is that tungsten has a very high melting point; is that right?
A. Correct.
Q. And that melting point is high enough to withstand the intense heat produced in an incandescent light bulb?
A. Correct.
Q. But tungsten has a disadvantage in that it oxidises at a much lower temperature than the temperature produced when an electric filament is turned on; is that not right?
A. Can you repeat?
Q. Tungsten has a disadvantage in that it oxidises when it comes into contact with air -- that's right, isn't it?
A. Unless it is hot.
Q. Wait a minute. Light bulbs are generally an inert

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atmosphere. The inside of a light bulb is an inert atmosphere, is it not?
A. Yes, most in vacuum or some inert gas will fill the glass bulb.
Q. That's right, and it's usually a mixture of argon and nitrogen, is it not?
A. Yes, sometimes.
Q. But it's right, is it not, that the oxidisation of tungsten occurs at a much lower temperature, it starts to occur at a much lower temperature, than that which is the temperature produced when an electric filament is on? Do you know that or not? If you don't know, say so.
A. If there's no oxygen inside the glass, but when it's turned on, there will be no oxidation.
Q. That's not the question. The question is the temperature at which the oxidation of tungsten first begins to occur. Do you happen to know when the oxidation of tungsten begins to occur?
A. I do not exactly remember at what temperature the oxidation will happen.
Q. It's right, is it not, that when the filament of a light bulb comes into contact with oxygen, that filament is converted into an oxide?
A. Yes.

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Q. It's right also, is it not, that that oxide is a yellowish colour?
A. It has a range of colours. Sometimes it will appear yellow, and mostly white.
Q. But we're talking, are we not, about WO3?
A. Yes.
Q. Right. Because the atomic symbol for tungsten is W?
A. It's W, correct.
Q. Tungsten oxide is WO3. Now, it's right also, is it not, that the filament of a light bulb cools down very quickly once the electric source, electricity source, is withdrawn?
A. Correct.
Q. It's also right, is it not, that when a heated tungsten light bulb comes into contact with air, the oxidation occurs within seconds?
A. Correct.
Q. Something like two seconds, and the filament is converted into tungsten oxide.
THE CHAIRMAN: Do you agree with the first part of the question --
A. Agree, agree.
THE CHAIRMAN: -- that it happens in about two seconds?
A. Two seconds, I don't agree with this one. Almost immediately. I don't -- it depends on numerous factors.

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Once oxygen comes in, the oxidation will start. When the heat is not hot enough, then the oxidation will stop. So it's quite difficult to say how much the timing. But two seconds, I did not heard of this one, the oxidation will complete within two seconds. It will happen, just --
MR SUSSEX: But it happens very quickly, doesn't it?
A. Very quick, very quick.
THE CHAIRMAN: The expression you used was "almost immediately".
A. Yes, correct.
MR SUSSEX: It's right, is it not, that a light bulb which is turned off will rapidly cool, and if thereafter broken, oxidation won't occur?
A. Correct.
Q. Right. It's right also, is it not, that the light bulbs that we're talking about on the Lamma IV were powered by electricity?
A. Yes.
Q. And the source of that electricity was within the machinery space on board the Lamma IV?
A. I don't know where the power source coming.
Q. You don't know where the power was coming from?
A. I just know it's powered from electricity, yes.
Q. Let us assume for a moment that the power was coming

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from the engine room. Right?
Could I take you to the FS bundle at page 652. This is a depiction of the state of the vessel at 20:41 hours on 1 October. We see that at that stage, the engine room is totally submerged.
A. Yes.
Q. But the navigation lights, the ones you examined, are still above water.
A. Yes.
Q. Now, it's likely, is it not, that when the power source of the navigation lights went below water, the power would have been extinguished?
A. Correct, if it is the only power source.
Q. We can then move on to page 653 --
THE CHAIRMAN: Do we know anything about the power sources, Mr Shieh?
MR SUSSEX: That's what I'm trying to find out.
THE CHAIRMAN: For example, where the batteries were kept, where the emergency power supply came from?
MR SHIEH: We will look into that.
MR SUSSEX: Such information as I have at the moment is that there was a battery supplying the -- a reserve battery supplying the navigation lights, but it was in the engine room.
If we move on to page 653, we see the position of

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the vessel as at 21:03 hours, so some 20 minutes later.
A. Yes.
THE CHAIRMAN: I think to help you, Dr Cheng, we ought to say this. This is the best attempt that -- I think these were firemen? Fire officers were trying to collate the information to help the Inquiry. This is not intended to be a scientific calculation.
A. Okay, I understand.
THE CHAIRMAN: So just take that on board.
MR SUSSEX: But as at 21:03 hours, we still see the navigation lights on the port and starboard sides of the vessel above the water.
A. Yes, but this is just referring to a sea that is calm.
Q. Referring to?
A. If there are some waves, maybe water will reach the side lamp.
Q. I accept that is a possibility.
A. Just from this photo, I agree that the sidelight is above the sea.
Q. But it does appear to be the case that the engine room was breached and the engine room was rapidly flooded and totally submerged before the port and starboard navigation lights went underwater.
Would you agree that if the submersion of the engine room had the effect of cutting off the electricity

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supply, it is probable that there would be sufficient time for the navigation lights to cool down such that there would not be oxidation such as you describe?
A. Yes, I've said that I agree with you if this is the only power source.
Q. Right.
A. I have answered you.
Q. Could we just look at the photographs that you have produced of your laboratory examination. I think they now appear at page 398-4. That's the port light. Is it right that this examination was conducted on 15 November 2012?
A. Yes.
Q. It's right also, isn't it, that these bulbs for examination entered your laboratory on 19 October 2012? I think we see that from paragraph 4.7.
A. Yes.
Q. Would it be right to say that you don't know what anybody was doing with those lights, whether they were being switched on or used, between the time that the Lamma IV was raised and the time that you examined the lights in your laboratory?
A. The first time I examined this light should be on -- let me see. Mr Chairman, I need to refer to my notes. I want to confirm which date, should be 15th or 18th.

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THE CHAIRMAN: Yes.
A. This is the first time I take a record of these sidelights.
THE CHAIRMAN: Yes, please refer to your contemporaneous notes.
A. I examined these two sidelights on 15 October. At that time I observed that the glass bulb already snapped, and there's no big differences between the glass bulb when it was delivered to our laboratory.
Before 15 October, Lamma IV was cordoned off and protected by police at the dockyard.
MR SUSSEX: Right. But if, for example, someone had turned a bulb on with a broken glass, in the period from the raising of the Lamma IV to the time when you examined the bulbs, there would have been immediate oxidation of the tungsten filament, wouldn't there?
A. It will have -- I am not sure whether it can be turned on after the glass bulb has broken.
But in this situation, the tungsten oxide will mainly found on the filament, the filament, the coil filament. But for this case, we can find the filament -- sorry, the tungsten oxide, the white oxide could be observed on the -- this is called -- for example, the two metal wires holding the filament. Why? Because there is a difference. If the glass bulb was

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broken, and then somebody turned on the light, because the heat is quite localised, then the oxide will immediately form on the surface of the coil filament.
But for this case, because I found tungsten oxide in other areas, on the two metal stands holding the filament, then this supports that the glass bulb was still intact, because when it worked with the glass bulb -- when the filament was under heating inside the glass bulb, the tungsten will, because of high temperature, vaporise inside the glass bulb. So when the glass bulb is cracked, some oxide inside the glass bulb will immediately react with the oxygen and deposit on the other part of the broken glass.
So for this case, I observe some tungsten oxide in area other than the coil filament, my opinion is that this filament was turned on before the glass bulb was broken, instead of the situation just raised.
Q. But it is right, isn't it, that if, for example, you manage to break a glass bulb without breaking the filament, and you then turn a light bulb on, the filament will immediately react with oxygen in the air and the filament will become tungsten oxide?
A. Yes, I have, but and also, for this case, I don't think the filament will snap and missing. I don't agree this situation. It's quite impossible that the glass bulb

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was broken and somebody turned on the power, resulting in the observation similar to one that I noted. And it is impossible.
THE CHAIRMAN: Just let me understand that.
Another factor you take into account in forming your opinion is that you don't think the filament would have snapped if the bulb was broken when the bulb was turned on?
A. Yes.
THE CHAIRMAN: You don't think it would have snapped?
A. Yes.
THE CHAIRMAN: Thank you.
MR SUSSEX: But subsequently, those bulbs were removed and brought to your laboratory?
A. Yes.
Q. So it's possible, is it not, that the filament might have broken during that transit?
A. It might be, but I have said that before they deliver or remove from the light housing, I have make a preliminary examination of the glass bulb and I have made record of this. So before I do an examination in the laboratory, I find the situation of the glass bulb was quite similar to one that I examined at the scene.
Q. Could we go then to your page 398-4. It's your examination worksheet in relation to the port side

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navigation light bulb, or the filament of the port side navigation light bulb.
THE CHAIRMAN: The photograph?
MR SUSSEX: Yes, it's the photograph. It's described as an examination worksheet.
THE CHAIRMAN: Yes. Thank you.
MR SUSSEX: If I understood your evidence correctly, what we see at the top and the bottom are two sides of a broken filament; is that right? Two parts of a broken filament?
A. Yes.
Q. You did not test what you describe as the powder to see whether it was in fact tungsten oxide, did you? I think you've said this already.
A. Yes, I did not.
Q. You didn't test that. Now, what metal is holding the filament in the picture at the top and bottom? Did you ascertain what particular metal that was that was holding the filament?
A. Usually some steel. I'm sure it will not be tungsten.
Q. Right, it's not tungsten. And it's not a metal which reacts with air to produce tungsten oxide or any other white powder, is it?
A. Yes.
Q. So why is it in the photograph that this white powder is

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attaching so enthusiastically to metal which is not tungsten?
A. I have just explained that. Because when the light bulb was turned on with the glass bulb intact, and because of the high operation temperature of the filament, some tungsten will vaporise. Vaporise, that means some of the tungsten will become air, fill up the glass bulb. So when the glass bulb was broken and the air came in, then the tungsten in the air will react with the oxygen to form tungsten oxide. Then this tungsten oxide, because it is a solid, then it will find some place which is cool to deposit on it. For this metal bar, it is a good surface for tungsten oxide to deposit on it. That's why even if this metal stand is not tungsten, we can find some tungsten oxide on it, because it's a deposit from the air.
Q. But when tungsten oxide is dry, it doesn't adhere to a metal, does it?
A. Sorry?
Q. When tungsten oxide is dry, it does not adhere to other metals, it doesn't stick to other metals?
A. What do you mean, "stick"?
Q. Well, stick. It's not sticky. It doesn't stick to a metal.
A. I would use the term "deposit" on the metal.

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Q. Well, deposit. But it's just as likely to fall off, is it not?
A. Yes.
Q. It's right, isn't it, that these filaments that you show in your photographs had been submerged for some time in salt water?
A. Yes. Yes, that's why we saw some rusting on some parts, just like on page 398-3.
Q. Would I be right that when you have, in the conduct of your professional duties, examined bulb filaments to see whether they were illuminated before their glass enclosure was cracked, you were doing so in the context of a collision on land?
A. Collision on land?
Q. On land, land collision.
A. Yes.
Q. And you weren't concerned with the complication of submersion in salt water?
A. There will be no difference on land or submerged in water.
Q. Well, did it occur to you to test whether the white deposit was salt crystals?
A. If it is salt, it won't selectively deposit on the filament. I would expect everywhere of the broken glass bulb will find this kind of salt. So I'm pretty sure

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this is not the salt from the sea.
Just like the photo now, we saw on page 398, we saw the base of the stand, the brown part -- yes, the cursor is pointing at it. If this is salt from the seawater, I will suppose that some white particle will deposit on this area. But the fact is that most of the white powder was deposited on the filament. So the possibility that the white powder is salt from seawater, is excluded.
Q. Well, I'm concerned really only with the red and green light. Is it not right that the deposit is pretty extensively shown on your photograph at page 398-4?
A. Yes, agree.
Q. But it's right, is it, that it did not occur to you to test whether that deposit was salt?
A. The formation of tungsten oxide depends on numerous factors. Just like -- he has raised that some tungsten oxide will appear yellow. Some tungsten oxide appears white powder. It depends on a lot of factors. How much oxygen coming inside, how far is the reaction, what is the temperature? A lot of variables. So it's quite difficult to correlate the amount of white powder. It just depends on whether white powder was observed or not.
Q. But don't you think that in the circumstances of this

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case, where there was the additional complication that these light bulbs had been submerged in salt water, it would have been sensible to test the white powder?
A. My opinion is that for my experience in examination of this glass bulb, my previous experience told me that this is exactly tungsten oxide. And also, I just -- I need to further explain that my conclusion drawn is not just based on the presence of white powder; it includes the cracking of the glass bulb inside an intact housing. These two informations combined together give me a conclusion that water ingressed into a hot glass bulb.
THE CHAIRMAN: How long would it take you to perform a test to establish that it is tungsten oxide?
A. Just take a few days. Just one or two days. Depends on the availability of the machine.
THE CHAIRMAN: Thank you.
MR SUSSEX: Could we then discuss the cracking. If we go to police photo album V, starting at page 306 we see photographs taken on 15 October 2012 of the port and starboard navigation lights.
A. Yes.
Q. If we go, for example, to page 311, we see that the light involves a casing, or housing, as you call it, the light --

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A. Okay, casing or housing. Never mind.
Q. Right. On the top, there is a watertight access cap, is there not?
A. Yes.
Q. That access cap can be opened and raised for re-bulbing and cleaning?
A. Yes.
Q. Yes. The light itself, as we see from page 306, is a clear light bulb?
A. Yes.
Q. And the colour is achieved by either glass or plastic -- do you happen to know what it was? -- within the casing that surrounds the bulb.
A. You mean the red one?
Q. Yes, red or green, whichever colour you want. That's achieved by glass or plastic within the casing.
A. If I remember -- I'm not sure, but my impression is that it should be plastic. Red plastic.
THE CHAIRMAN: Do we have a photograph of the exterior of the navigation light?
MR SUSSEX: Yes, we do. Pages 310, 311, 313.
THE CHAIRMAN: One that shows the red? Yes.
MR SUSSEX: Page 311.
THE CHAIRMAN: Can we zoom in to that, please.
MR SUSSEX: Tell me, do you get the impression that that

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light is illuminated, if you look at that picture?
A. Just looking at the picture?
Q. Yes.
A. It's not illuminated.
Q. These casings are intended to withstand ordinary weather conditions, are they not, and to be, to all intents and purposes, waterproof?
A. I agree.
Q. Right. So that when they become submerged, the pressure upon the bulb within is not just water all around; it's water coming in from some source in the casing. Is that right?
A. Yes.
Q. And that water could present itself in the form of a jet, could it not?
A. What do you mean, "of a jet"?
Q. Well, if water is coming through a confined space, the pressure that comes through the hole is likely to be greater than the water pressure surrounding the casing. If I put my thumb over a hose, I increase the water pressure, don't I --
A. Mm'hm.
Q. -- by confining the space through which the water is able to travel?
A. Yes.

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Q. So that if water is entering these otherwise watertight casings through some limited aperture, there could be a jet of water entering the casing, could there not?
A. It depends on how this housing/casing was made. From the top, I find each should be watertight and it has a screw to make it screwed. You can close the top lid tightly. But underneath, I am not sure whether it is made to -- make it perfectly watertight. Just depends on how much -- from my opinion, it could have been water coming from the bottom, because I did not make a very, very detailed examination. But I did find water inside, first of all. And if did the water come in from the bottom, if that from the bottom wall, then one place the water can come inside. So the pressure will -- how do you say? -- inside the housing will be similar to the outside.
So I won't expect the water will jet inside, just leak in slowly if there is an opening at the bottom.
Q. If there is the aperture such as I've described, this is obviously not watertight, because water got in -- and it did come in as a jet, so assume that for the moment -- that would be sufficient to crack a bulb without it having been warm beforehand, wouldn't it?
A. Sorry, can you repeat?
Q. Yes. If water entered this navigation light casing in

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the form of a jet, that jet would be sufficient to crack a light bulb, even a cold light bulb; do you agree? It's possible. That's all I'm asking.
A. I don't think that glass bulb was so weak, just a jet of water can crack it. Actually, I did some experiment in the laboratory to crack the glass bulb. I found it needs some force. I don't agree that a jet of water can crack the glass bulb.
Q. Well, there's --
A. In addition, if this casing is really watertight, so it depends on how much the -- anyway, my opinion is that a jet of water cannot occur inside the housing.
Q. Well, we do know, don't we, that the all-round light remained intact and workable?
A. Yes.
Q. We can assume from that, can we not, that the casing in that case did not flood?
A. I did not examine, because I have a record in my statement that I cannot open it at the time of my examination.
Q. Right.
A. So I just advised the police to seize the glass bulb for me to conduct the examination.
Q. But does it not suggest that that particular casing was in fact watertight?

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A. Maybe it will be affected but it may -- the glass bulb may not be turned on or off. I have no opinion on this one.
Q. But if the water was entering casing under the pressure of a jet, I do suggest --
A. I don't agree with this.
Q. -- that would be sufficient to crack a light bulb.
THE CHAIRMAN: He's dealt with that and he rejects your proposition.
MR SUSSEX: So be it.
One last point. You expressed the view that the manhole covers on the main deck of the Sea Smooth were not watertight --
A. Yes.
Q. You've said that that is because you did not see any rubber on the outside of the hole; is that right?
A. Yes.
Q. Did you look underneath the manhole cover?
A. Yes.
Q. This is a photograph taken today of a manhole cover from the Sea Smooth, and do you see that there is a rubber ring around the perimeter of the manhole cover?
A. Yes.
Q. So would you accept that that is intended to achieve a watertight seal?

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A. I agree.
THE CHAIRMAN: When you examined them when you were on the boat, Sea Smooth, did you find any rubber seals on the inside of the covers?
A. I have examined -- during the whole process, I asked the crew member to take away all the manholes, and I did examine one or two. I don't exactly remember how much. After I examined one or two, then I just want to know what is the -- my focus go into attention to the compartment underdeck. So I did not make a detailed examination, all of these. But from this photograph, I agree that there is a -- it seems like rubber sealing at the edge. If this is the rubber sealing, I agree that this one should be a watertight bulkhead.
THE CHAIRMAN: But my question was this: of the manhole covers, the one or two, I think you are now saying, that you did examine, the covers, did you see any rubber seals on them?
A. I remember I don't see at that time. But I'm --
MR SUSSEX: Have you a specific recollection that you did not see rubber seals, or is your evidence that you don't remember?
A. I did not remember.
MR SUSSEX: Thank you, Dr Cheng.
MR PAO: Mr Chairman, may I have leave to ask Dr Cheng a few

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questions on his measurements of the thickness of the aluminium plating on the hull of the Lamma IV?
THE CHAIRMAN: Where does he deal with that?
MR PAO: Paragraph 3.2.4. The last sentence of that paragraph, Dr Cheng says:
"The thickness of the aluminium alloy hull at the hole ..."
THE CHAIRMAN: Yes, certainly.
Examination by MR PAO
MR PAO: May we have Dr Cheng's photograph 11 on page 387 up on the screen, please. The top one, yes. Thank you.
Dr Cheng, that's the photograph taken by you of what you call the gash and the jagged hole in the port hull of Lamma IV.
A. Correct.
Q. You did make some measurements of the size of the gash and the size of the hole.
A. Yes, including the thickness.
Q. Yes. You've also taken measurements of the thickness of the aluminium plating.
A. Correct, yes.
Q. Can you tell me first what instrument did you use for the measurements of the thickness?
A. I used a pair of calipers that is designed for measuring thickness.

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Q. Can you show to us at which point of the gash and the jagged hole you measured the thickness of the aluminium plate?
A. I don't exactly remember. Should be the bottom part, because I just stand next to the hole and the gash and then make a measurement which I can reach.
Q. You mean just the part below the waterline?
A. Correct.
MR PAO: Thank you.
A. But, Mr Chairman, I need to provide some additional information.
THE CHAIRMAN: Please do.
A. The thickness I measured is on the hole and the gash, because at that area, the hull, the plating, has a little bit deformed. So it will affect very accurate measurement. So this is just for information, just let me know how thick of the hull. So if it did really need some accurate measurement, I will suggest that that make it in the other part, for example an intact part of the hull, rather than on the part that I measured. But this is the only way I can do it, because I don't have some instrument to make the measurement of the thickness of the hull at the intact area.
THE CHAIRMAN: So a more accurate way of measuring it would be on an intact part of the hull, with different

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instruments?
A. Correct.
THE CHAIRMAN: Thank you.
Yes, Mr Mok?
MR MOK: Mr Chairman, I have a few questions concerning the seating.
THE CHAIRMAN: Yes.
Examination by MR MOK
MR MOK: Dr Cheng, I would like to ask you a few questions concerning the seating.
A. Okay.
Q. The first question follows on from a question from my learned friend Mr Grossman.
A. Okay.
Q. You remember you said that at the point of collision, there would be some backward force being applied against the back of the chairs?
A. Yes.
Q. But that may not be sufficient to dislodge the seats?
A. Yes.
Q. Now, my question is, would that force which is applied to the back of the seat be sufficient to have shaken the seat a little bit or loosen the seat a little bit?
A. Yes, I agree, it will.
Q. So would that force which has shaken or loosened the

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seat therefore make it easier eventually for the seat to be dislodged when the subsequent event --
THE CHAIRMAN: The missing part of the second time you put the question was "a little bit", because that's how you put it the first time.
MR MOK: Yes.
THE CHAIRMAN: So, "shaking and loosening the seat a little bit, would that ..."
MR MOK: Yes, okay.
Dr Cheng, following on from your earlier answer, I know that you haven't conducted any experiment on that basis. Would the shaking of the seat as a result of the backward force make it easier therefore for the seat to be dislodged upon the happening of the subsequent events, for example the vessel becoming vertical at a subsequent stage?
A. Yes, I have already pointed out that the grip of the screw will loosen over time. So this, on the collision, it will -- one occasion with additional force, to further loosen this hole. This is just one of the factors. But whether it will -- just what I have explained, for this force, it's not much very hard, I will not expect that if this is just -- without this collision, my opinion is that the seats will still detach if the vessel is coming up vertically.

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Q. Thank you. My second question relates to the single seat which remained attached inside the upper deck.
A. Yes.
Q. One issue arising from that is whether more force or less force is required to detach the seats or the other seats, because you did an experiment in relation to that seat.
A. Yes.
Q. A question that arises is whether more force or less force is necessary to detach the seats that you had not tested.
A. My opinion is that less force is needed.
Q. One possibility which was mentioned this morning was that perhaps the screw holes relating to the seat that remained attached might have been less compromised than the screw holes which were in relation to the other seats which were detached; do you remember that? That was one possibility? Less loose?
A. Yes. Okay, yes.
Q. You remember that?
A. I remember.
Q. May I put to you another possibility. Is it also possible that maybe no passenger happened to be sitting or hanging onto this particular seat, and therefore there wasn't any force being applied on the seat at the

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time of the accident, so that it still remained, attached subsequently? Would that be a possibility?
A. You mean before the collision or after?
Q. At the time of the accident, you said that some people may be sitting or hanging onto the back of the chairs --
A. Yes.
Q. -- when the vessel was vertical --
A. Yes.
Q. -- and that force would be sufficient to detach the chairs.
A. Yes.
Q. Would it also be possible that in relation to this single seat which remained attached, that there was no passenger sitting or hanging onto it so that may be one reason why it was not detached?
A. Sure, it may be, but just an opinion that if there is no more thing to grab and if there is a seat, I will expect somebody will try to grab it.
Q. Well, you don't know that. There is a possibility --
A. Yes, I don't know. Agree.
Q. Would it be fair to say that on the existing evidence, you will not be able to tell which possibility is more likely than the other?
A. Which two possibilities?
Q. The first possibility is that the screw holes in this

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particular seat were more firmly attached or less loosened than the other seats. That's one possibility.
A. Okay.
Q. The other possibility is that during the accident, no-one was actually sitting on or hanging on to this one seat and therefore it remained attached.
A. Yes.
Q. So on the existing evidence, would it be fair to say that you would not be able to tell which possibility is more likely than the other?
A. Yes, agree; I cannot tell.
Q. May I now come to your experiment on the seats.
A. Okay.
Q. Can I ask you to please look at paragraph 5.6. That paragraph relates to the result of your experiment on that single seat, and you said that the force that was necessary to detach that particular seat was less than 230 kg; right?
A. Yes.
Q. You also said that when the vessel was in a vertical position, because people would be hanging on or sitting on the back of the chair, then it would require less force, which is said to be less than 115 kg, for that chair to be detached.
A. Yes.

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Q. The question I would like to ask is, what is the position in relation to the vessel during its normal operation? When the vessel is in its normal operation, as between these two extremes -- one is 230 kg, the other is 115 kg -- in its normal horizontal operation, what kind of force would be necessary to detach the seats from the flooring?
A. It would be about 115 kg.
Q. Sorry, when the ship was in horizontal position and people were sitting on it --
A. Yes. If there is force equivalent to 115 kg pulling on the back of the seat, then it will detach.
Q. 115 kg?
A. Yes.
Q. I don't know whether you can assist or not. During the normal operation of the vessel, do you expect that kind of force to be attained so that the seat may be dislodged during the normal operation?
A. Yes. I have explained previously that during normal operation, a passenger will sit on the seat, there are two forces. One of the forces push the seat downwards towards the deck, and the other force pulling -- that means, when the passenger mean back or because the wave caused some movement of the passenger, part of the force will exert on the back of the seat. Depends on how

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strong of these two forces. And because the body -- when we sit on a seat, on a chair -- I call it chair -- then the force pressed towards the ground is the whole body weight. And the force exerted on the back of the seat is just part of the body weight. So in this operation, under these circumstances, there will be no resulting force -- we use some scientific term -- no final force will put on the back of the seat. Just like the experiment I conducted, when we lean back on the back of the seat, of this chair, the seat, it is not mounted on the floor. I won't topple.

So that means I just -- my opinion is that under normal operation, I think this force can't be achieved with just a passenger sitting on it, unless some people, just like a kid, when they sit on a chair they have a lot of movement, or elongate their leg, pressing to the front chair, or do something which is against normal use.
Q. Do something extreme?
A. Yes.
Q. Thank you. My last question is this. May I invite you to look at Dr Armstrong's report at page 467, please. Do you see the bottom drawing?
A. Yes.
Q. Just a quick explanation. That is the section of the

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fibreglass and the foam that was embedded in it.
A. Yes.
Q. The top part, I believe, is what is called the woven roving. It's what you call the fibreglass layer.
A. Exactly.
Q. You measure the fibreglass to be about 3 mm in thickness?
A. Correct.
Q. Now, let's assume that this layer is 5 mm, instead of 3 mm, which was actually the case.
A. Yes.
Q. On the basis of your experiments, and all the evidence that you have seen, including what is set out in Dr Armstrong's report, would it be possible for you to exclude the possibility that the seats which were detached in this accident would still have been detached even if the fibreglass layer had been 5 mm thick? Could you exclude that possibility; that the result would still be the same?
A. First of all, my experiment just focused on the existing fibreboard and, without any further experiment, I cannot exclude the possibility or determine how much force is needed to detach a seat if the woven roving or the fibreboard was increased from 3 mm to 5 mm.
THE CHAIRMAN: You'd need to do the experiments with 5 mm?

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A. Yes, if I need to answer, but I cannot exclude the seat still coming out. Sure, it depends on how much force is applied. Maybe if the same force, it may be a little bit difficult. It should be much -- I will agree that a higher force may be needed.
MR MOK: Yes. But you don't know how much?
A. Yes, I don't know how much.
MR MOK: Thank you.
I have no further questions.
THE CHAIRMAN: Thank you.
Mr Shieh?
Further examination by MR SHIEH
MR SHIEH: Dr Cheng, my first question arose out of the question concerning the possibility that the substance that you saw, the white substance, could well be I think salt. Do you remember the question?
A. Yes.
Q. Can you tell us where the various samples on which you did your experiment are at the moment?
A. Sorry?
Q. Can you tell us where the various samples of tungsten that you conducted your experiment on are at the moment? Are they still kept by the Government laboratory?
A. Yes.
Q. Is it now still possible to conduct an experiment on the

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white powder, to see whether or not it is tungsten oxide or salt, or is it too late?
A. Sorry, the glass bulb has already been returned to the police. If the police further submit to our laboratory, we can conduct an experiment on this one.
Q. Right. But of course we have heard of chain of evidence and all that, people touch it, and fingerprints and all that, but salt would not suddenly become tungsten oxide, tungsten oxide wouldn't suddenly become salt; right? If it's tungsten oxide, it does --
A. Yes.
THE CHAIRMAN: Let's deal with that issue now.
Mr Mok, will you cause the police to deliver these bulbs to the doctor for examination.
MR MOK: Yes.
THE CHAIRMAN: Doctor, would you be kind enough to test them for tungsten oxide and report your results to us.
A. Sure. Yes.
MR MOK: We'll facilitate that.
MR SHIEH: Perhaps also for salt, that being the only possible alternative suggested at the moment.
A. Yes.
Q. Salt, I take that to be sodium chloride?
A. Yes. A lot of salt. There's not only sodium chloride.
MR SHIEH: Well, I'm not sure what kind of salt is

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suggested.
THE CHAIRMAN: If you establish it's tungsten oxide, that's good enough, I think.
MR SHIEH: There is a number of questions concerning the characteristics of tungsten that I wish to follow up with you.
You were asked a question that tungsten actually cools down quickly. Do you remember being asked that question?
A. It's not -- it did, because depends on the size of this object. For the filament, my knowledge is that it will cool down very fast and won't have further reaction with the oxygen ingress.
Just like I have some experience on examining the indicator light of vehicles, because it keep on flashing and I have examined one of these glass bulb, it's that glass bulb has really under operation when the collision happened. But because it turned off, it keep on flashing, and I have encountered a case that one of the glass bulbs was cracked when it suddenly -- it is off in the flashing cycle. And at that time, I cannot find any tungsten oxide, because it already cooled down. But the colour of the filament has changed and has some characteristic -- colour change will be observed on the filament, and this is also well-published in lots of

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papers and textbooks, indicating that the glass bulb would crack when the filament just turn off and because the temperature going down. So at this case, no tungsten oxide was noted.

So that's why I know that the filament will cool down very fast.

THE CHAIRMAN: As measured by a flashing indicator light?

A. Yes.

THE CHAIRMAN: Thank you.

MR SHIEH: Meaning that if the power goes off and the light goes out and the heat, which was supposed to be very high in the tungsten filament, would subside within a short time --

A. Yes, yes. Maybe it will go down to the temperature no tungsten oxide will form, very fast.

Q. Right. What we are interested in is -- obviously if you can't estimate, you can't estimate. But within what order of magnitude of time would it cool down to such a state where no tungsten oxide could be formed?

THE CHAIRMAN: Is that your flashing indicator bulb example?

A. Yes, maybe just less than one or two seconds.

MR SHIEH: Right. So within one or two seconds of the power going out, the temperature would be such that there could no longer be any oxidation?

A. Yes.

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Q. Thank you. There's one question I would like to ask you, about one hypothetical scenario put to you by Mr Sussex.

Remember he put to you the hypothesis that power could well have been turned back on, resulting in the relighting of the tungsten filament, after the vessel had been salvaged?

A. Yes.

Q. After the crack in the bulb? Do you remember that series of questions?

A. I remember.

Q. If you have a vessel such as the Lamma IV, let's say the bulk of it was submerged in water, with a result that the power has gone out -- it is then salvaged -- to what extent is the possible that you can actually switch back the power?

A. I have no idea.

Q. You have no idea. Thank you.

Can I just for a moment, Mr Chairman.

THE CHAIRMAN: Yes.

MR SHIEH: I'm waiting for certain information to be supplied.

THE CHAIRMAN: Whilst you're discussing that, might I mention this. We have some photographs that were taken of the windows of Lamma IV to try and help us with

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the window latch. I'm bound to say the task has not been addressed in the detail that is perhaps necessary.

Perhaps we could go to the fourth photograph. That's the one. Zoom in on that, if you would, on the latch.

MR SHIEH: I understand that a prior set of photographs have also come in in this form (indicates).

THE CHAIRMAN: I understood that these had been taken over lunchtime by the police. That's the information I was given.

Mr Mok, do you know if that's the case?

MR SHIEH: The set of six photographs?

THE CHAIRMAN: Yes.

MR MOK: I think there's some misunderstanding. These are previous photographs, and they are still organising fresh photographs to be taken. So, Mr Chairman, maybe we will have that on Monday.

THE CHAIRMAN: Well, I'm relieved. For the avoidance of doubt, what we'd like displayed in detail is the latch arrangement, how easy or difficult it is to open up the sliding window. That's the point.

MR MOK: Perhaps could those be taking the photographs be reminded that it's the latch that we are particularly interested in.

THE CHAIRMAN: Thank you.

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MR SHIEH: Dr Cheng, I was told that once the engine had stopped and gone out, it couldn't be restarted. Would you be in a position to comment on that?

A. No, I can't.

THE CHAIRMAN: By that you mean once the engine had been submerged in water?

MR SHIEH: Submerged in water, yes.

But this witness wouldn't be able to confirm one way or the other, so that has to be left to some other witness, probably Dr Armstrong.

I have no further questions for you. Thank you.

THE CHAIRMAN: Dr Cheng, thank you very much for assisting us with your detailed evidence, which has been most helpful.

A. Thank you.

THE CHAIRMAN: If we can trouble you for reporting back to us by way of a short report the analysis of the white powder found in these bulbs.

A. Okay.

THE CHAIRMAN: If you're able to do that as soon as possible, that would help us.

A. Sure. I will.

THE CHAIRMAN: Thank you very much. You're free to go.

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(The witness withdrew)
MR SUSSEX: Mr Chairman, I provided to the Commission's counsel a job order from Cheoy Lee Shipyards dated 24 September 2012, which records a purchase order for the construction of a new stem plate on the port side of the Sea Smooth. If any further explanation is required, perhaps somebody could tell us they require a statement.
THE CHAIRMAN: Thank you very much. If you give it to counsel, no doubt they'll draw it to our attention in due course. Thank you for that.
MR MOK: Mr Chairman, we have on our part I believe sent an email to Lo & Lo concerning footnote 10 and the part of the hull that was supposed to be under maintenance, the information --
THE CHAIRMAN: Sorry, the what that was supposed to be -- under maintenance?
MR MOK: Yes. There is an email which has been sent over, I believe, by now.
THE CHAIRMAN: Yes. Thank you very much.
Just a matter of housekeeping. I think perhaps we ought to add the photograph put in by Mr Sussex to Dr Cheng's bundle, but marked as coming from Mr Sussex, showing the manhole cover, and then we'll remember that it relates to his evidence.
MR SHIEH: Mr Chairman, just as a matter of the road

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forward. On Monday, Dr Armstrong is expected to be called. Depending on when he finishes, we may just be able to slot in Dr Peter Cheng.
THE CHAIRMAN: Well, let's see how we go.
MR SHIEH: We'll see.
THE CHAIRMAN: The first issue will be whether or not there are issues between the two of them. But if there are, if necessary, where there are issues, that could be dealt with and then perhaps we can try and bring in, if we need to, Dr Peter Cheng to deal with the issues. And we can deal with the other matters that are not issues.
MR SHIEH: I can inform the Commission that there is a second supplemental report of Dr Armstrong in the pipeline because he has taken in the various materials and evidence that has been given, and he will be dealing with Dr Peter Cheng's report.
THE CHAIRMAN: Right. When is that going to be served on the Commission and the parties?
MR SHIEH: I think later this afternoon, as soon as we adjourn it will be finalised and then served.
THE CHAIRMAN: I think it ought to be served this afternoon so that everyone has time to digest it and take instructions.
MR SHIEH: Yes.
THE CHAIRMAN: So I'd ask that that be done this afternoon.

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MR SHIEH: Can I enquire when Dr Peter Cheng is expected to leave Hong Kong, because I understand --
THE CHAIRMAN: We were told --
MR SHIEH: -- it's the 31st.
THE CHAIRMAN: We were told the 31st.
MR MOK: That is what we were told.
MR SHIEH: Would it be in the evening or the morning.
MR MOK: I don't know.
MR SHIEH: Could it be checked? Because if it's the evening, there could still be the whole day of the 31st.
MR MOK: In the morning, I'm just told.
MR SHIEH: Right. I understand. Thank you.
THE CHAIRMAN: Thank you for that.
There are a few outstanding matters I'd like some information on. Do we have an insurance policy yet from Hongkong Electric? A policy, not extensions, amendments and so on.
MR GROSSMAN: Yes.
THE CHAIRMAN: Do we have the whole policy?
MR GROSSMAN: I have it. You don't, I do; you will.
THE CHAIRMAN: Thank you. Are you able to do that this afternoon?
MR GROSSMAN: Yes.
THE CHAIRMAN: Thank you.
We asked for information about the characteristics

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of the light at the end of the entrance to the Lamma Power Station typhoon shelter, what Mr Sussex calls the fog light.
MR SHIEH: The fog light.
THE CHAIRMAN: Do we have information about the characteristics?
MR GROSSMAN: I think we indicated everything had been taken by the police.
THE CHAIRMAN: Mr Sussex wanted to know about correspondence. All we're interested in is what are the characteristics. What is the size of the bulbs?
MR SUSSEX: We do have some papers that deal with that, and those --
THE CHAIRMAN: The current one?
MR SUSSEX: Yes. Well, I think so. Those have found their way into the bundle. I'm not sure I understand them at the moment, but we're trying to work our way through them.
THE CHAIRMAN: Mr Grossman, could you address your request Mr Sussex had a separate one. We just want to know the size of the bulbs operating on 1 October.
MR GROSSMAN: 1,000 watts.
THE CHAIRMAN: Thank you. Two bulbs?
MR GROSSMAN: Not sure.
THE CHAIRMAN: Well, could you become sure and then tell me.

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Mr Shieh, I think the police assistance was being enlisted to find out whether or not there's anything of relevance for us in CCTV film from the CCTV cameras at the piers in Lamma Power Station.
MR SHIEH: That has been outstanding for some time, I understand.
THE CHAIRMAN: Who is addressing this issue?
MR SHIEH: I believe Hongkong Electric.
THE CHAIRMAN: I think it was the police who were being asked to help. I just want to make sure that the ball hasn't been dropped and is lying in a corner.
MR SHIEH: I still remember the saga about requesting the CCTV footage at the Lamma pier.
The police have taken the CCTV, so it is now in the custody of the police.
THE CHAIRMAN: Yes.
MR SHIEH: I can see instructions being taken.
THE CHAIRMAN: Mr Mok, are you able to help?
MR MOK: I'm not able to help at this moment. I think we need to liaise with them to see where exactly the films are.
THE CHAIRMAN: I think the issue was that the normal recording has been wiped, but it may be on a hard disk. If someone can look at the hard disk -- that I think was the offer from the police -- if they could do so and do

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so now, that would be helpful.
MR MOK: Yes. We'll press them further.
THE CHAIRMAN: Thank you.
Mr Shieh, we'd like some help, the matter having been touched on by Mr Sussex today, as to the various sources of electricity in Lamma IV.
MR SHIEH: Yes.
THE CHAIRMAN: Undoubtedly there will be engine, generator, engine room batteries. There may be house batteries.
MR SHIEH: Just as the evidence was ongoing, in fact I have caused enquiries to be made, first of all from the Cheoy Lee plans and from various sources. I wouldn't want to give a rash answer, but that --
THE CHAIRMAN: No, no, I'm not asking for an rash answer now.
MR SHIEH: That ultimately is a question of fact which will be looked into and will be dealt with by primary evidence.
THE CHAIRMAN: In particular address the issue of whatever is the emergency lighting system.
MR SHIEH: Back-up, and where they're located.
THE CHAIRMAN: And where the batteries are.
MR SHIEH: Yes, they will be.
THE CHAIRMAN: Thank you very much. In which case, we'll adjourn until 10 o'clock on Monday.

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(4.39 pm)
(The hearing adjourned until 10 am on Monday, 28 January 2013)

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I N D E X